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MIND
AND ITS DISORDERS

A TEXT-BOOK FOR STUDENTS
AND PRACTITIONERS

BY
W. H. B. STODDART, M.D., F.R.C.P.
ASSISTANT PHYSICIAN TO BETHLEM ROYAL HOSPITAL

Dr. Joseph Catton

WITH ILLUSTRATIONS

LONDON
H. K. LEWIS, 136, GOWER STREET, W.C.
1908

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DEDICATED

TO

MY REVERED TEACHER,

DR. J. HUGHLINGS JACKSON, F.R.S.,

IN GRATEFUL ACKNOWLEDGMENT OF MANY

KINDNESSES.

PREFACE

THE present work has been prepared with the object of providing the student and practitioner with a succinct account of our existing knowledge of mental diseases. My endeavour has been to induce the reader to think neurologically of mental processes, normal and morbid, my own work during the past twelve years or more having consisted of clinical research into the nature of nervous phenomena associated with mental disorder. Some of the matter has been already published in the *Journal of Mental Science*, *Brain* and elsewhere.

The book is divided into three sections. In the first which deals with normal psychology an attempt is made to correlate mental processes with their physical substrata in the nervous system, the transcendental psychology of modern schoolmen being ignored as useless to the practical physician of to-day. In the second section the psychology of the insane is treated in a similar manner.

The classification of mental diseases adopted in the third section almost coincides with that of Kraepelin; but from my experience as a teacher I have thought it advisable in a few instances to change his nomenclature, because it has at times appeared to be confusing to students.

I must confess to having made free use of various existing works on the subject, especially James's 'Principles of Psychology', Titchener's 'Experimental Psychology' and 'Outline of Psychology', Kraepelin's 'Psychiatrie', Paton's 'Psychiatry', Ballet's 'Traité de Pathologie Mentale', Agostini's 'Manuale di Psychiatria', and Tanzi's 'Malattie Mentali'.

I have aimed at keeping the book abreast of current literature on the subject; but I regret that I have been obliged deliberately

to ignore the honest labours of some writers, because their researches have been based on an unsatisfactory classification and their cases described insufficiently to allow re-classification.

I have to thank my old friend, the Rev. John Taylor, D.Lit., and Dr. S. A. K. Wilson for revising and correcting the proof-sheets, and I wish to take this opportunity of thanking the publishers for their generosity in allowing me so many illustrations.

W. H. B. STODDART.

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MIND AND ITS DISORDERS

PART I

NORMAL PSYCHOLOGY

CHAPTER I

INTRODUCTORY

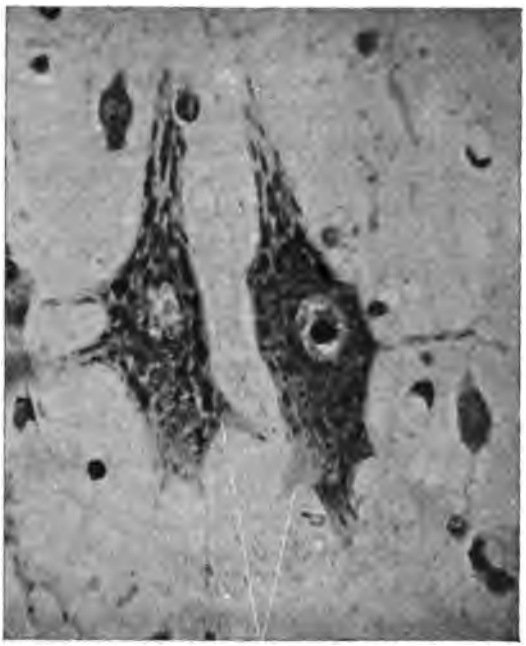
In the struggle for existence in the world of constant conflict every animal has to a greater or lesser degree developed some means of attack and defence against its enemies. The spider has its spinning-glands, the bear its claws, the deer its antlers, the stag its horns. In each animal possessing a nervous system of an organic order these mechanical weapons of attack and defence are a necessary part of their equipment for existence. But man is possessed of a weapon of greater subtlety and power than all of these in brain. By its possession and delicacy of adjustment and by its capacity to control the individual in its environment man's mind has in these latter days made him master of the animal, vegetable and mineral worlds. By the adaptability of his brain man is enabled to exercise control over all living things, even the lowest of the elements, to the minutest of micro-organisms, to the variations of their species, to animate and inanimate nature. Of Nature in relation to man in its totality, man has to recognise them, to suit his own purposes and even to change elements, millions of miles beyond his reach.

Apart from the delicacy of adjustment which renders the complex mechanism intrinsically [illegible] gear, man's brain is dependent for its proper functioning upon the good services of many subordinate organs, such as the kidneys, stomach and many others. As a result there is a

to which human flesh is heir which does not react upon the brain and give rise to mental symptoms, more or less pronounced. In some cases, as in the delirium of pneumonia, the physician has but little difficulty in discovering the physical basis of the disorder. In other cases, the underlying physical changes are of such an elusive nature as to escape detection, although a detailed history of the patient may have been obtained and a most careful physical examination made both during life and after death, advantage having been taken of all the most recent clinical and pathological apparatus and methods. These latter cases, which exhibit the most difficult diseases of the nervous system, are the main object of consideration in this volume.

At all times, the nature of the human mind has been an object of man's own admiration and speculation, which have given rise to two schools of thought. According to the first, the 'spiritualistic', the material brain is pervaded by an immaterial something, the mind or soul, which is held responsible for all man's thoughts and actions. The adherents to this view are divided into two sub-classes: (*a*) Those who regard the connection between body and soul as a Divine arrangement (Occasionalists); and (*b*) those who regard the soul as the essential principle of life (Animists). According to the second, or 'interactionist' school, 'mind' is not to be regarded as a 'thing', but 'mentation' is to be regarded as a 'process', having its physical basis in the brain. This is the scientific view of the present day, which will be adopted throughout this manual. Incidentally, it commits us to the view that insanity is a disorder of the process of mentation and, therefore directly dependent upon disease affecting the brain, either primarily or secondarily.

The medical student approaching the study of mental disorder for the first time will already have acquired some considerable knowledge of general medicine; this he will find essential to the comprehension of his new subject. It is also essential that he should have a sound knowledge of the anatomy and physiology of the nervous system, and this he will have acquired in the course of his ordinary medical studies. It will now be necessary for him to study the nervous system in some fresh aspects, including the way in which it subserves the functions of mentation. This is the science of physiological psychology, some knowledge of which must obviously precede the



x

FIG. 1.—TWO NORMAL BETZ CELLS.

Showing the arrangement of the Nissl bodies (chromatoplasm—tigroid substance) in large cubes or oval spindles which extend into the dendrites but not into the axon (*x*) or the eminence from which this arises. The nucleus is situated centrally and is clear. (×600.) [Negative kindly lent by Dr. John Turner of Brentwood Asylum.]

To face p. 3.

study of morbid psychology and of those diseases which are characterized by mental disorder.

According to the **neuron theory,** which at the present day meets with almost universal acceptance, the nervous system consists of myriads of isolated neurons, each of which has numerous potential connections with other neurons, by which nervous impulses may be transmitted from one neuron to another.* Ingoing nervous impulses are conveyed from the peripheral sense-organs to the central nervous system in general and, so far as we as students of insanity are concerned, to the cerebral cortex in particular; and outgoing nervous impulses are conveyed from the central nervous system in general and, so far as we as students of insanity are concerned, from the cerebral cortex in particular to the muscles of the limbs, head, and trunk.

A **neuron** or nerve-cell is, therefore, to be regarded as a mechanism for the transference of nervous impulse from one part of the organism to another. Each neuron consists of a cell-body or perikaryon, an axis-cylinder or axon, and one or more protoplasmic processes called dendrons. A nervous impulse enters by way of one of the dendrons and passes through the cell-body to the axon, whence it is transmitted to the dendron of another neuron.

Each **cell-body** is bathed with blood-plasma, being contained in a space which is in direct connection with a blood-capillary by means of a small vessel whose lumen is too narrow to allow of the passage of blood-corpuscles (Adamkiewicz), and the cell-body itself is, according to some, traversed by canaliculi which allow the blood-plasma to penetrate to its interior. It is enclosed within a cell-membrane, which appears to be more or less reticular in structure.

If the cell-body be stained with methylene-blue (Nissl's method), it will be observed to contain in its middle a large unstained nucleus, in whose centre there is a deeply stained nucleolus (sometimes two). It is further to be observed that, when stained in this way, the substance of the cell-body consists of an unstained fibrillar or reticular matrix (achromatoplasm), enclosing a large number of roughly triangular stained granules (chromatoplasm—tigroid substance or Nissl bodies). The fibrils of the achromatoplasm can frequently be traced through the

* The fact that protoplasmic continuity between neurons sometimes, but rarely, occurs is of academic interest only.

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cell-body from the dendrons to the axon, or from one dendron to another; it is hence inferred that the function of this substance is to convey nervous impulses from one part of the neuron to another, and it has, on this account, received the name of 'kinetoplasm'. And from the fact that the chromatoplasm gradually disappears as the result of fatigue, it is inferred that this substance serves the function of nutriment to the cell. It has accordingly received the name of 'trophoplasm.'

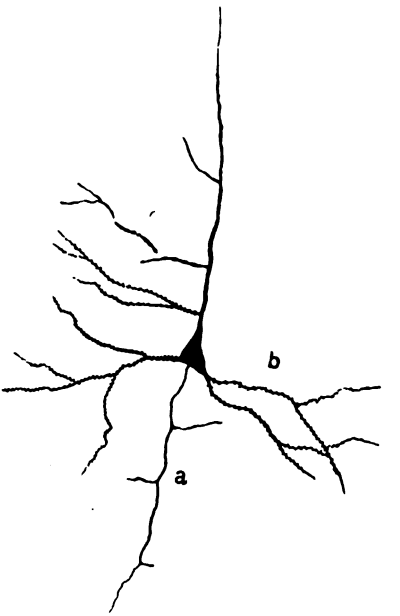

FIG. 2.—A MOTOR CELL FROM THE PRECENTRAL GYRUS (SEMI-DIAGRAMMATIC).

a, Axon with collaterals; *b*, dendron showing gemmules; *c*, moniliform (degenerate) dendron from which the gemmules have disappeared.

The **protoplasmic processes** or **dendrons** are, as a rule, branched and beset with large numbers of minute twigs or thorns, like so many pin-heads protruding at right angles to these processes. It has been demonstrated by Lugaro that these twigs, which are called **gemmules**, are more or less amœboid, since they are protruded during sleep and retracted during activity.* Little

* This observation was made on dogs in the following way: The animals were prepared, and cannulæ were introduced into their carotids. The animals being severally in a state either of activity or somnolence, a

differentiation of structure can be made out in the dendrons under the microscope.

The **axis-cylinders,** or **axons,** are longitudinally fibrillated and, so far as they remain within the confines of the grey matter, unprotected; but, as soon as they reach the white matter, they are enclosed within myelin sheaths. In their course the axons give off branches at right angles to themselves; these are known as **collaterals** and are destined to convey impulses to the protoplasmic processes of other neurons.

Transmission of the Nervous Impulse.—It is probably to be inferred from Lugaro's observations (*vide supra*) that, when a nervous impulse passes from one neuron, α, through another, β, to a third, γ, the collaterals of α cause certain gemmules on the dendrons of β to react and to protrude. Contact being thus insured between α and β, the nervous impulse passes up one of β's dendrons through its cell-body and axis-cylinder to one of its collaterals. Here reaction again occurs: one of γ's gemmules is in turn protruded and the impulse passes on to γ. During the process other gemmules of the neurons concerned are retracted.

The sites of contact between neurons are called **synapses,** and it is probable, as McDougall has pointed out, that they play a most important rôle in psychical processes. I have said that, by the protrusion of gemmules, contact is made between one neuron and another; but, as a matter of fact, it is probable that contact is incomplete, and that a very thin layer of inter-neuronal tissue always intervenes and offers a certain amount of resistance to the passage of a nervous impulse across the synapse.

There is considerable evidence in favour of this resistance (1) The ordinary rate of conductivity of a nervous impulse along a nerve-fibre is about 50 metres per second, and there is no reason to suppose that any delay occurs in its transmission through the cell-body of a neuron; indeed, such evidence as is available negatives the suggestion. But when the impulse has to be transmitted across a synapse, as in an ordinary reflex action, there is delay in the transmission amounting to one-hundredth of a second —time enough for the impulse to have travelled another third

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quantity of Cox's fluid was run into the cannulæ, and the cortical neurons were thus fixed *in situ*. Sections of the cerebral cortex were subsequently cut and examined, and it was found that in those animals which were in a state of activity at the time of the experiment the gemmules were retracted, while *in the somnolent animals* they were in protrusion.

of a metre, if the nerve-tract were continuous instead of interrupted. (2) The rate of transmission of an impulse along a nerve-fibre is constant, and independent of the intensity of the stimulus; whereas an increase in the intensity of a stimulus increases the rapidity with which a reflex action takes place. This shows that there is a certain amount of resistance to stimuli, which is less readily overcome when they are weak than when they are strong and is to be conceived as occurring at the synapse. (3) If a series of sensory stimuli, which are individually insufficient to provoke a reflex, be applied in rapid succession to a reflex-provoking area, reflex action results. This, again, is indicative of synaptic resistance.

Other characteristics of synaptic transmission, as shown by the study of reflex action, are susceptibility to fatigue and to the influence of drugs, necessity for good circulation in the neighbourhood of the synapse, and irreversibility of direction of the nervous impulse (law of forward conduction). The transmission of impulses along nerve-trunks, on the other hand, is influenced but little by drugs or by interference with the circulation, is practically insusceptible to fatigue and may take place in either direction.

For the present I will allude to only two more characteristics of reflex action, viz., (*a*) after-discharge, and (*b*) facilitation. (*a*) If a stimulus be applied to a nerve-trunk connected with a muscle, the muscle ceases to contract almost synchronously with cessation of the stimulus; but, if contraction of the muscle be induced reflexly (through a reflex arc), irregular contractions of the muscle continue for some time after cessation of the stimulus (after-discharge). (*b*) If a reflex be capable of being stimulated through two or more receptive (sensory) areas, and if subliminal stimuli be given to these (stimuli which are insufficient independently to provoke the reflex), reflex contraction occurs when both areas are stimulated together, the cumulative action of the two subliminal stimuli being sufficient to induce a nerve-current in the ' final common path ' (facilitation). For example, a sudden sound and a flash of light, if of sufficient intensity, are each capable of inducing reflex closure of the eyelids. This reflex closure will also take place if two such stimuli, neither of which is sufficiently intense independently to provoke the reflex, occur simultaneously or even with a short interval of time between them. Another example of facilitation which has a closer

bearing on the mental processes presently to be considered is the following : if a spot be found upon the cerebral cortex of a dog, the stimulation of which produces a movement which can also be produced reflexly, and if subliminal stimuli be applied simultaneously both to the spot on the cortex and to the receptive area of the reflex, movement will result, although either stimulus alone is insufficient to induce the movement. *Inter alia*, this explains why reaction to a stimulus takes place more quickly when attention is directed to the idea of movement than when it is directed to the stimulus (*vide* p. 70).

To explain these phenomena, McDougall has conceived every neuron to be charged with a certain quantity of nerve-force, which he calls ' neurin ', much in the same way as a Leyden jar is charged with electricity. The effect of any stimulus to a neuron is to set free in it a further quantity of neurin. When a neuron thus becomes surcharged, the excess of neurin overflows at its synapses. Naturally the overflow is more likely to take place at some synapses than at others, especially at those which are in constant use and where overflow has taken place before. Considerations such as these give us a peep at the physical basis of ' habit '.

When one neuron receives from another an overflow of neurin, it tends in its turn to become surcharged and to overflow into other neurons, and so on. The ultimate result is either diffusion of nerve-force if the quantity of neurin in the nervous system happens to be at a low ebb or, more commonly, there is a final overflow into motor-tracts and, conformably to the law of conservation of energy, contraction of muscle results, and neurin is converted into work.

Mind.—When we speak of mind, we mean that faculty or function in us by which we become aware of our surroundings and their distribution in space and time, by which we experience feeling, emotions and desires, and are able to attend, to remember, to reason and to decide.

In the succeeding pages it will be shown that sensation is the essential attribute, the only essential attribute, of conscious organisms, and that all the more complex mental functions are derivable therefrom. In the course of evolution, sensation, which the author regards as an attribute of the lowest unicellular organisms, is retained in the individual cells of the highest multicellular organisms, such as man. Every cell is regarded as

having sensation, the neuron being the most sensitive of all, sensation therein being aroused by a surcharge of neurin. Sensations of cells of the other highly organized tissues (skin, retina, etc.) are represented again and again on the following scheme.

Scheme of the Nervous System.—Sensations aroused at the periphery are first represented in bipolar cells, the dendrons of which are usually devoid of gemmules. They are next represented in cell-stations, whence there is a divergence of paths of conduction, one path going cerebrumwards, and the other cerebellumwards (via the restiform body). It is significant that no such station occurs in the olfactory path, which has no connection with the cerebellum. Following up the cerebro-petal path, we find that sensations are next represented in groups of cells which may be classed together under the heading of 'basal ganglia', the next representation being in the sensory so-called 'centres' of the cortex cerebri, which, together with the motor area in front of the fissure of Rolando, have received the name of **projection centres.**

The highest representation of sensation is in the remainder of the cerebral cortex, which has been divided by Professor Flechsig into four great **association centres.** It is probable that these association areas form the physical basis of all true mental processes; but the projection areas should not be excluded from the physical basis of mind until it has been demonstrated that all mental functions, including the elementary function sensation, are in abeyance when the association areas are destroyed, either by experiment or disease.

The diagram will help to elucidate the above points. The connections figured between the projection and association areas are strictly in accordance with Flechsig's researches; and it will be observed that the cortex cerebri is a colony of neurons, having very numerous intercommunications. It is a colony of the most sensitive, and therefore the most conscious, cells of the organism. The combined consciousness of these neurons constitutes the consciousness of the colony, and this is none other than the consciousness of the organism. This combined consciousness is aroused whenever resistance at the synapses is overcome by the escape of a surcharge of neurin from one set of neurons to another.

A little consideration of the phenomena of unconsciousness will show the importance of sensation in the building up of mental life

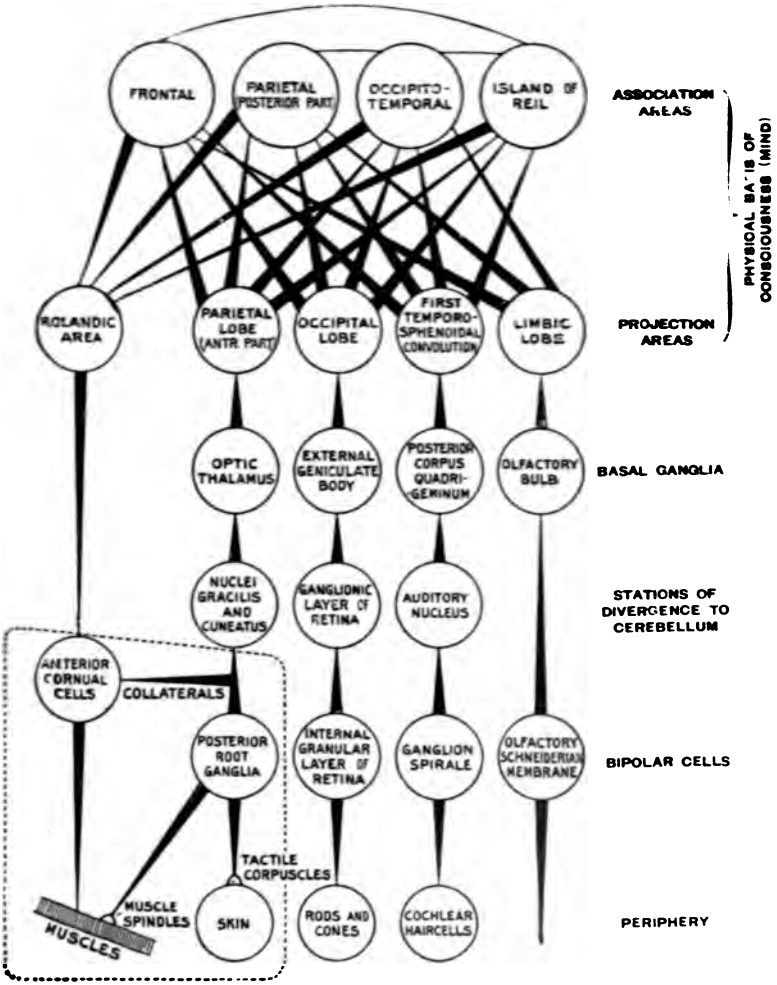


FIG. 2.—SCHEME OF THE NERVOUS SYSTEM.

The dotted line surrounds the neurons subserving the function of the superficial reflexes.

To face p. 8.

When a person faints, his skin becomes numb and finally anæsthetic; his vision grows indistinct till all is dark; sounds grow more distant; there is, perhaps, a momentary sound of rushing waters, then all is silent. When a patient is chloroformed, he loses sensation and is unconscious; his mental phenomena and sensations disappear *pari passu*.

In the unconsciousness of deep sleep no sensations are perceived and, at times, it requires a strong sensory stimulus to wake the sleeper, the mind being in abeyance. The new-born infant, whose sensations are as yet but feebly developed, spends the greater part of its time in sleep. In the coma of epilepsy, apoplexy, intracranial pressure, diabetes, uræmia etc., the criterion of unconsciousness is the lack of response on the part of the patient to pin-pricks, shouts, electric batteries or any other form of powerful stimulus which the ingenuity of the physician can devise. If none of these stimuli evoke a response, the patient's mind is in abeyance; for the time being he has no mind. In the case of children deprived of the senses of hearing and vision from birth there results the condition known as 'idiocy by deprivation of the senses'; they experience fewer sensations than healthy children and are therefore *mentally* deficient.

Finally we have Strumpell's classical case of the patient who suffered from universal anæsthesia, bilateral deafness and unilateral blindness. All knowledge of the outside world came to him through his sound eye and, when this eye was closed, he went to sleep; in other words, he lost consciousness.

Our general conclusion is, therefore, that sensation is essential to consciousness and, in our further considerations, it will be shown that mind, with all its higher functions of memory, discrimination, will, reason etc., can be evolved from sensation alone, without invoking the aid of a 'thinking principle', 'apperception' or any other form of higher intellectual spontaneity.

It will be objected that this theory does not explain the origin of sensation and that it involves the adoption of the hylozoistic view that sensation is an attribute of matter. Whether sensation is an attribute of matter or not is a metaphysical question, which probably never can be settled, and which it would be out of place to discuss in a practical handbook; but the author believes that the above mode of thinking of the nervous system in its relation to mind will at least prove helpful to the psychologist and the student of insanity.

CHAPTER II.

SENSATION.

WHAT sensation is we do not know. Some psychologists seek to explain it by the principle of relativity, which recognizes that every sensation is experienced in relation to some other sensation, that we are conscious only as we are conscious of change. Black can only be felt in contrast to white or, at least, in distinction from a paler or deeper black ; a sound can only be sensed as contrasting with other sounds or with silence. If all the stimuli at any given moment were to continue *ad infinitum* without change, sensation, and therefore consciousness, would disappear.

All this we are prepared to admit, given sensation ; but this doctrine, which is known as the 'Law of Relativity', begs the whole question. If change of stimulus is all that is required to arouse sensation, every stone in the road must have sensation, exposed as it is to an enormous variety of stimuli. Indeed, although its supporters would not admit it, the doctrine is hylozoistic at bottom ; it assumes that sensation is an attribute of matter, a view with which I am disposed to agree, but to discuss it would lead us into the domain of metaphysics.

When we think, we think of something, of some object in our present or past environment ; and we think of it in terms of the sensations aroused by the object. If, for example, we have an idea of a cigar, the idea is composed of revived visual sensations (brown image of characteristic shape), olfactory sensations (aroma), perhaps auditory and gustatory sensations (crackling when rolled between the finger and thumb, saltish taste), tactile sensations etc. Such sensations are the elemental processes of which consciousness is composed, and are associated with physical processes in definite bodily organs.

A simple sensation, as the word is used here, is a pure abstraction. Nobody ever experienced the colour red, the tone C or

the temperature 100°, and nothing else: these are but the attributes of objects in the environment of the individual who sees the colour, hears the tone or feels the temperature. It is however useful, and indeed necessary, to study such simple sensations in the abstract before proceeding to the consideration of higher mental functions.

Sensations may have four attributes—quality, intensity, duration, and extent. The **quality** of a sensation depends upon the specific nature of the peripheral sense-organ and associated sensory nerves, by the stimulation of which the sensation is aroused (eye, ear, tongue, or Schneiderian membrane) and upon the nature of the stimulus to the sense-organ. All forms of stimulation of the optic nerve (electrical, mechanical or thermal) give rise to a sensation of light and to no other kind of sensation. All forms of stimulation of the auditory nerve give rise to a sensation of sound and to no other kind of sensation, and so forth. All highly specialized nerve-tracts have their own specific *qualia*. On the other hand, a red-sensation is different from a blue-sensation, because there is a difference in the nature of the stimulus to the retina, depending upon the different wave-lengths of the two kinds of light. In the domain of hearing, a C-sensation is different from a D-sensation on account of the difference in the nature of the stimulus to the organ of Corti, depending on the difference in the rate of vibration of the air in the two cases. Similarly a sweet-sensation is different from a salt-sensation, an eau-de-Cologne-sensation from a white-rose-sensation, and so forth. These are differences in the *quality* of sensation.

By the **intensity** of a sensation we mean that attribute by which one sensation is stronger or weaker than another. The sweetness of saxin is more intense than the sweetness of sugar, but the quality of the sensation is the same in the two cases. When a tuning-fork is struck, the resulting sound is at first more intense than subsequently when the fork begins to ring off; but the quality of the sound remains the same. Similarly one light may be more intense than another of the same kind, and one odour more powerful than another, although both may be of the same quality.

By the **duration** of a sensation is meant the length of the period during which it is experienced: and by its **extent** is meant the amount of space over which it spreads; *e.g.*, the colour red may occupy half the visual field or a sensation of pain two square inches of the forearm. On the other hand, certain sensations

(olfactory, gustatory and auditory) cannot be said to have any extent.

A sensation then is made up of quality, intensity, duration and extent; and no sensation can exist without at least the first three of these attributes.

Sensations are classified according to the sense-organ to which a given stimulus must be applied in order to produce them (eye, ear, nose etc.); and, according to whether or not the sense-organ is on the surface of the body, they are divided into two classes, sensations of the special senses and organic sensations. The eyes, ears, nose, tongue and skin, being all more or less superficially situated, hearing, smell, taste and the cutaneous sensations are grouped together as the special senses (the 'exteroceptive field' of Sherrington): and, inasmuch as the muscles, tendons, joints, alimentary canal, lungs etc. are more deeply situated, sensations from these organs are grouped together as organic sensations (the 'proprioceptive field' of Sherrington).

This division into organic sensations and special sensations is obviously of an arbitrary character. All sense-organs are peripheral so far as the brain is concerned; and there is no essential difference between a muscle-spindle and a tactile corpuscle. If the reader is inclined to object that the stimulus in one case is from without and in the other from within, let him make firm external pressure on his own abdomen, and he will find that the stimulus from without can give rise to 'organic' sensation; or let him blow up his Eustachian tubes (Valsalva's experiment), and he will find that stimulus from within can give rise to 'special' sensation. It is true that the deep situation of the end-organs of so-called 'organic' sensations prevents their being so accurately observed as the so-called 'special' senses; but this does not constitute a real psychological difference in their nature. We must therefore reject the distinction between organic and special sensations as serving no purpose in the study of psychology.

Our classification of sensations will therefore be as follows:

Visual sensations (stimulus: light)—
- Sensations of brightness.
- Sensations of colour.

Auditory sensations (stimulus: air-vibration)—
- Sensations of noise.
- Sensations of tone.

Olfactory sensations (stimulus : ? chemical action of odorous particles).

Gustatory sensations (stimulus : ? chemical action of certain substances).

Cutaneous sensations—

Sensations of pressure or touch (stimulus : mechanical).

Sensations of pain (stimulus : mechanical, thermal, electrical or chemical).

Sensations of warmth (stimulus : thermal).

Sensations of cold (stimulus : thermal).

Muscular sensations (stimulus : contraction of or pressure on muscle).

Tendinous sensations (stimulus : stretching of tendon).

Articular sensations (stimulus : pressure on articular surfaces).

Circulatory sensations (stimulus : change in arterial or venous tension).

Sensations from the alimentary canal—

(*a*) Pharyngeal sensations (stimuli : mechanical, thermal or chemical ; dryness of mucous membrane).

(*b*) Œsophageal sensations (stimuli : mechanical, thermal or chemical ; antiperistalsis).

(*c*) Gastric sensations (stimuli : distension, presence of abnormal substances in the gastric contents, dryness of the mucous membrane ; anti-peristalsis).

(*d*) Intestinal sensations (stimuli : distension, peri-stalsis).

Respiratory sensations (stimuli : excessive or deficient supply of oxygen, irritating substances).

Urinary-bladder sensations (stimulus : distension).

Sexual sensations (stimuli : change of blood-supply and secretory activity of genital apparatus, contraction of muscle, etc.).

Static sensations (stimulus : difference of pressure in semicircular canals).

These are the most important, but the student will be able to supplement the list from his experience of cases of heart disease, thrombosis, cholelithiasis, etc.

Since the intensity, duration and extent of a sensation are

always the intensity, duration and extent of some quality of sensation, it follows that the quality is the most important attribute which we have to consider. For various reasons, however, it is more useful to consider the minor attributes of sensation first.

The questions which arise in this connection are: What is the smallest intensity, duration and extent of a sensation that can be experienced in the various sense departments? By how much must a stimulus be increased in order to cause an increase of sensation? And what is the greatest intensity, duration and extent of each that can be attained?

Intensity.—*Just-noticeable sensations.* If we go into a room from which all light is excluded, we experience a sensation of blackness; but, in addition to this, we have many faint sensations of light, due to stimulation of the retina by the ordinary processes of metabolism. Owing to this intrinsic retinal light, there is considerable difficulty in determining the least light-intensity which is just noticeably brighter than the black of the field of vision. It has however been estimated, by passing a current of electricity through a platinum wire until it became just visible, that the least noticeable intensity of light is approximately one three-hundredth of the light of the full moon reflected from white paper. It is curious that, so far as I am aware, this intensity has never been expressed in terms of candle-power, the usual standard of measurement of light.

In audition, as indeed in all other sense departments, there is considerable difference in different individuals. As an average result, however, it has been ascertained that a normal individual can just hear the sound of a cork pellet, weighing one milligramme, at millimetres distant from the ear, falling through one millimetre on a sheet of glass. This result is obtained under the experimental condition of absolute silence, the reason of which we shall see presently. Under similar conditions, we should find that an ordinary musket-shot could be heard at a distance of 7,000 metres (about 3½ miles).

The just noticeable sensation for pressure differs in different parts of the body. One five-hundredth of a gramme can be sensed on the forehead, eyelids, temples, outer surface of the forearm and back of the hand; but it requires no less than one-twentieth of a gramme to be sensed on the cheeks, nose, palm of the hand, abdomen and thigh. On the nails and heels the just-noticeable weight is as much as one gramme.

Up to the present, the other senses have not been to any extent subjected to investigation with a view to determining the just-noticeable sensation in each case.

Extent.—The senses that play the most important part in the perception of space are those of touch and vision. Accordingly these senses alone will receive consideration in determining the smallest amount of space which can be appreciated by them.

If two white threads, placed together against a dark background at a convenient distance from the eye, be gradually separated; it is found that they can be seen as two instead of one, when they subtend an angle of one degree at the cornea.

The appreciation of two cutaneous stimuli as separate from one another varies enormously in different parts of the body, to such an extent that it is doubtful whether any two parts of the skin are the same in this respect. On the finger-tips, for instance, two compass-points can be distinguished as two separate impressions when they are one millimetre apart; but upon the skin of the back the distance must be 60 millimetres.

Duration.—In estimating the duration of a sensation, we are met with the difficulty that a sensation does not immediately cease with its stimulus. For this reason a rotating disc, half spectral red and half spectral green, appears white. In order that the colours may not fuse in the whole extent of the circumference of the disc, it is necessary that the disc should rotate less rapidly than four times per second: a light-stimulus of minimal duration gives a visual sensation lasting one-eighth of a second.

In order to find the least noticeable duration of pressure, the finger is lightly laid upon a toothed wheel, which is made to rotate. At a certain velocity the teeth of the wheel cannot be separately distinguished. From an experiment of this nature, the minimal duration of pressure-sensations can be determined.

Although the minimal intensity, duration and extent of sensations have been separately considered, it is to be observed that the minimum in each case is dependent upon the other attributes. For example, a point of light of given intensity may not be appreciable to the senses, whereas a square foot of light of the same intensity may easily be distinguished. Moreover, if this square foot of light lasts but a fraction of a second, it may be inappreciable to the senses; whereas, if it be allowed to last for half a minute, it may become perfectly obvious.

The *maximal intensity* of sensations is, as a rule, so unpleasant or painful that the value of introspection is destroyed. The greatest appreciable intensity of sensations cannot therefore be determined.

The *maximal extent* of visual and cutaneous stimuli is produced by stimuli of the whole of both retinæ and the whole of the skin respectively.

The *maximal duration* of sensations has not been determined.

Weber's Law.—We now come to the last question: By how much must a stimulus be increased in order to produce a just-noticeable difference in sensation?

It has been shown that the answer to this question varies for the different sense modalities. A light stimulus must be increased by one-hundredth in order to produce a clear increase of sensation. Sound stimuli and pressure stimuli must be increased by one-third, and muscular stimuli (estimation of weights) by one-seventeenth, for the production of a clear increase of sensation.

To take an example: If a weight of one gramme be allowed to rest on the hand, it is necessary to add one-third of a gramme, and if a weight of a pound be allowed to rest on the hand, it is necessary to add one-third of a pound, and no less, in order that the observer shall notice an increase of weight in each case.

This law was discovered by the physiologist Ernst Heinrich Weber, and has accordingly been called, after him, 'Weber's law'. It was, however, only in special cases that he examined its validity. The general applicability of the law was demonstrated by Gustav Theodor Fechner, who reduced it to the more general form: Sensation increases as the logarithm of the stimulus, the logarithmic base varying for the different sense modalities.

The law is not, however, absolutely correct for sensations of very high and very low intensity: it applies only to those of moderate intensity.

Weber's law is constantly being exemplified in our everyday life. It explains why an artificial light is useless in a room already illuminated by the sun while it is of great utility in the dim twilight, why we can hear a pin drop in a silent room while we cannot hear ourselves speak in a boiler-shop and why we cannot feel a tumour in a patient's abdomen when he contracts his abdominal wall.

There are various interpretations of the law. According to the *psychological view*, each sensation consists of a large number of elementary units, and those who hold this view speak of 'quantities' of feeling. Their interpretation of Weber's law is that the quantities of our feelings are related logarithmically to the quantity of stimulation arousing those feelings. *Psycho-physical interpretations* are based on the fact that weak stimuli make nerve-tissue more excitable without overcoming the resistance at the synapses, a feature which is exemplified by Sherrington's experiments illustrating 'facilitation'. Elsas has pointed out that a chemical balance, in so far as its frictional resistance to indicate small changes of weight is concerned, obeys Weber's law. Ebbinghaus supposes the intensity of sensation to depend on the number of neural molecules which are disintegrated in a unit of time.

It would seem that a psycho-physical interpretation of Weber's law lies nearer the truth than the psychological which, after all, is but a restatement of the facts; but it is beyond the scope of this work to enter into a discussion of the relative merits of these various hypotheses.

We now proceed to the consideration of sensation qualities.

Visual Sensation.

The characteristic quality of visual sensations is colour. The number of different colours that can be normally distinguished has never been determined; it amounts to many thousands. The different shades of colour that can be distinguished in the solar spectrum alone number 160; but many new colours can be constructed by mixtures of these. Further, the solar spectrum does not include white, black or grey, which are also colours from a psychological point of view: the physical fact that white light may be resolved by means of a prism into all the colours of the rainbow has no bearing upon the psychological quality of white.

If a spectral colour be illumined by white light and the intensity of that light be increased or diminished, the *quality* of the colour sensation changes; a spectral red, for example, becomes a pink or a brown when the intensity of the illumination is respectively increased or diminished. It has been shown that each of the spectral colours gives about 600 sensation qualities during the gradual intensifying of its illumination

with white light. Similar observations might be made on the number of sensation qualities resulting from an intensively graduated illumination of a spectral red by a blue light, and so forth.

The sensitive layer of the retina consists of rods and cones. At the fovea centralis, the spot of clearest vision, only cones are present. In the region surrounding this, rods and cones are present in fairly equal numbers ; while the periphery is almost devoid of cones. The cones are stimulated by bright light only, and it is through their reaction to light that we are capable of appreciating colour. The rods are much more sensitive and are rapidly exhausted by bright light. It is by their reaction that we are enabled to see in a light too feeble to stimulate the cones, but they do not react to colour ; coloured objects in a dim light look black, white or grey, red objects appearing black because red does not stimulate the rods. The difference between the excitabilities of the rods and cones may be studied on a starlit night, when one finds that many of the dimmer stars, which are easily seen at the periphery of the retina, disappear if one looks straight at them, so that the image falls on the rodless fovea.

There are about half a dozen theories of colour-sensation extant, none of which appears to the present writer to be quite satisfactory. A satisfactory colour theory must be able to account for all the facts of colour-blindness. It must account for cases of ' total ' colour-blindness in which all visual images appear as shaded drawings, for cases of ' red-blindness ' and ' green-blindness ' as well as for the more frequent cases of ' red-green blindness ' and for cases of monocular colour-blindness ; and it must account for the fact that we never come across cases of black-white-grey blindness with retention of vision for spectral colours. The theory which most nearly satisfies these conditions is that of Wundt, who supposes every retinal excitation to be compounded of two separable constituents, a colour excitation and a brightness excitation. When the achromatic excitation occurs, we sense black, white or grey. A chromatic excitation implies the presence of the achromatic. When a chromatic excitation occurs, any difference in the sense-quality results from a variation in the wave-lengths of light.

The theory of Hering takes cognizance of the fact that there are only six colours which cannot by introspection be analyzed

into simpler colours. These are black, white, red, green, blue and yellow. Violet is clearly analyzable into red and blue, orange into red and yellow, and brown into red and black. The theory assumes that there are three kinds of visual substance in the retina, probably lipochromes, whose katabolism gives white, red and yellow, and whose anabolism gives black, green and blue respectively.

The retina is not uniformly sensitive to colour over its whole surface. It may be demonstrated by means of the perimeter that there are three colour-zones merging into one another: an inner where all colour-tones are accurately estimated, this gradually passing into an intermediate zone where all colours are apprehended as blue, yellow, black, white or grey; and an outer zone in which all colours are apprehended as black, white or grey. These phenomena, when considered in conjunction with the fact that red-green is the most common variety of colour-blindness and blue-yellow a much rarer variety, suggest that black-white-grey vision is the first in order of evolution, blue-yellow next and red-green the last to develop. They also suggest that the cones are more recent in their evolution than the rods.

Near the centre of each retina there is a spot, corresponding to the entrance of the optic nerve, which is totally blind. This is easily demonstrated. If the accompanying diagram be held at a distance of about 12 inches in front of the left eye, the right eye being closed, and if the reader gaze at the cross, the spot will disappear. It is, however, to be observed that the spot

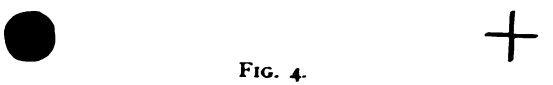


FIG. 4.

is replaced by the white of the paper, not by a blank. And if the reader take the trouble to copy the diagram upon the margin of his morning newspaper, and carry out the observation again, it will be seen that the blind-spot is filled in with print. If a vertical or horizontal line be drawn, that line does not appear shorter when the middle of its image falls upon the blind-spot. It follows therefore that the blind-spot has the same visual value as the rest of the retina, and that any area whose image falls upon it is filled up in the same way as the rest of the surface under observation.

Complementary colours are those whose combination gives white as a result, or at least a grey with no admixture of spectral colour. Such complementary colours are carmine and bluish-green, red and verdigris, orange and greenish-blue, yellow and blue, yellowish-green and violet, green and purple ; in a sense, black and white may also be regarded as complementary colours.

If any of these colours be presented in the field of vision, the rest of the field is tinged with the complementary colour. This is best demonstrated by the following experiment. On a piece of black cloth lay a square of grey paper with a hole in the centre. Under the grey paper pass towards the hole a slip of white or coloured paper. As soon as the coloured slip makes its appearance in the hole the grey square is immediately tinged with the complementary colour. If the slip be white, the grey paper darkens ; if carmine, the grey paper is tinged with bluish-green ; if blue, the grey paper is tinged with yellow, and so on. This is the phenomenon of **simultaneous contrast.**

The best examples of **successive contrast** are negative after-images. If we look at the sun for a moment and then look at a grey background, we see on the background a dark grey or bluish-grey disc, the negative image of the sun. This is an extreme case ; but after-images are easily obtained by gazing for an extended time, say one minute, at a strip of coloured paper. It is found that the after-image is of the complementary colour to that given in the stimulus.

It is also to be observed that the phenomena of contrast are effective in the after-image. This is, perhaps, best exemplified by Hering's original experiment, which is as follows :—Lay two small strips of equally dark grey paper on a background of which one half is white and the other half black, in such a way that they lie on opposite sides of the border-line and parallel to it. Gaze for one minute at a point on the border-line. Close or cover the eyes, and the negative after-image appears. The difference of the brightness of the strips in the after-image is generally much greater than during direct vision. A phase occurs in which the difference in brightness of the two halves of the background disappears, and both after-images of the strips are still clear, one brighter and one darker than the background.

This experiment shows that the difference in the brightness of the after-image depends upon a different state of excitation of

the corresponding parts of the retina; and from this we must conclude that the two parts of the retina corresponding to the two strips of equally dark grey paper were differently stimulated during the original observation. The conclusion is, therefore, that 'contrast is occasioned, not by a false idea resulting from unconscious conclusions, but by the fact that the excitation of any portion of the retina, and the consequent sensation, depends not only on its own illumination, but on that of the rest of the retina as well.'*

It has been observed that in the negative after-images the colours are complementary to those given in the original stimuli. In positive after-images, the colours are an exact reproduction of those given in the original stimuli. They are not as easily induced as negative after-images; but, when they occur, they usually precede the formation of the negative after-image.

Auditory Sensation.

The characteristic quality of auditory sensations is 'pitch'. The notes of a piano give tones of different 'pitch', their difference depending upon the rate of vibration of the wires and the resulting rate of vibration of particles of air.

The normal ear can distinguish many more tones than are represented on an ordinary piano; not only of a higher and lower pitch, but also many intermediate tones which cannot be produced on a piano without special adaptation of the instrument. By means of various scientific appliances it has been demonstrated that we can normally distinguish about 11,050 different tones. This number corresponds to the number of hair-cells in the cochlea; but physiologists are not inclined to the view that each hair-cell is tuned to a particular tone.

Besides musical tones, the ear is capable of distinguishing many varieties of noise. Noises are of two kinds, the first being due to air-vibrations of insufficient duration to give rise to a musical tone (two or three vibrations of extreme rapidity), and the second to a confused mixture of musical tones among themselves or with noises of the first class. To the first class belong 'thuds', 'bangs', 'cracks', etc.; and to the second class the rumble of the street and the roar of the waterfall.

* James, '*Principles of Psychology*,' vol. ii., p. 19.

The appreciation of pitch is not exactly the same for the two ears. A given tone in the middle of the musical scale is commonly apprehended by the right ear as being of a slightly higher pitch than by the left ear, the difference corresponding to that of two or three vibrations per second for the middle notes of a piano.

The same tone gives a different sensation quality when sounded upon different musical instruments. This depends partly upon the mechanism of the particular instrument; *cf.* the percussion of a piano, the scraping of a violin and the reedy vibration of an oboe. The different timbre or clang-tint of these instruments depends also on the formation of overtones. Overtones are tones of less intensity and higher pitch than the fundamental tone, which depend for their formation upon partial vibrations of the column of air in a wind-instrument or of the string in string-instruments.

It has been suggested that the appreciation of pitch obeys Weber's law, the pitch increasing in direct proportion to the logarithm of the vibration-rate.

Cutaneous Sensations.

The cutaneous sensations are four in number—sensations of pressure or touch, of pain, of warmth and of cold.

These are four distinct sense-modalities, as different as the senses of vision and hearing, each sense having a series of end-organs subserving its own particular function. According to von Frey, sensations of pressure are derived from the hair-bulbs and Meissner's corpuscles, those of pain from the free nerve-endings in the epidermis, those of warmth from Ruffini's cylinders and those of cold from Krause's end-bulbs.

With the head of a pin it may be ascertained that the sensation of pressure is more intensive at some spots of skin than at others, and with the point that the sensation of pain is more intensive at some spots than at others. Similarly, with a suitable blunt instrument so adapted that its point can be kept warm or cold, it may be ascertained that there are maximum spots for warmth and maximum spots for cold. These spots are respectively known as the pressure-spots, pain-spots, warm-spots and cold-spots. Of these, the pain-spots are by far the most numerous, and the cold-spots are more numerous than the warm-spots.

It has been found that these spots are not always in identically

the same place, but that each moves about over a small area of skin. It would be more strictly true to say that there are ' blotches ' of skin for these various sensations, and that these ' blotches ' slightly overlap one another.

The pressure-spots are situated over the hair-bulbs and are consequently to be found on the windward side of the hairs. Weak sensations of pressure can be evoked by moving the tips of the hairs. Pressure-spots are not, however, limited to hairy parts of the skin ; they are quite as numerous on the palm of the hand and the sole of the foot. We soon become adapted to sensations of pressure, *e.g.* :—pressure of clothing, because the pressure-sense is easily fatigued.

Similarly the sense of temperature is easily fatigued. This may be demonstrated by Locke's experiment :—Fill three basins, one with warm water, one with cold, and the third with water of moderate warmth. Place one hand in the first basin and one in the second. After a minute, place both hands in the third basin. The water will feel warm to the hand which has been in the cold water, and cold to the hand which has been in the warm water. But for the rapid exhaustion of the cold-sense, our morning tub would be almost intolerable.

TASTE.

There are four taste-qualities :—sweet, salt, sour and bitter. If the nostrils be plugged with cotton-wool, the tongue protruded and a number of substances thus tasted, it will be found impossible to discover more than these four qualities of gustatory sensation, either alone or in combination. Suitable substances for experiment are beef-tea, cod-liver oil, olive oil, alcohol and oil of cloves. With some of these there may be an additional sensation of stinging or tingling of the tongue ; but these will, of course, not be confused with gustatory sensations.

It has been discovered that certain of the lingual papillæ are sensitive to only one of the four taste-qualities, those exclusively sensitive to bitter being situated at the posterior part of the tongue.

Sensitiveness to one taste-quality may be fatigued, while the other taste-qualities remain unaffected. This would appear to indicate that each gustatory cell subserves a specific taste-quality.

A certain amount of contrast effect can be demonstrated

to exist in the case of gustatory sensations. For example, a salt solution so weak that it cannot be tasted under ordinary circumstances can be distinctly recognized as salt, if the mouth be first washed out with a strong solution of sugar. In this way, it has been shown that a contrast exists between salt and sour, and between sweet and sour. Bitter gives no contrast effects.

SMELL.

The psychology of smell is yet in its infancy, since the Schneiderian membrane does not lend itself to direct stimulation like the end-organs of other senses.

That smell plays an important part in the ordinary discrimination of flavour has already been shown by our first taste experiment.

The sense of smell is easily fatigued; and this phenomenon has proved very helpful in elucidating its psychology. For example, it has been found that, if the olfactory sense be exhausted for iodine, the odours of oil of orange, heliotropine, and alcohol cannot be sensed at all, and that the sense is also partially exhausted for a large number of other substances. Again, by this method of exhaustion it may be shown that a large number of odours, which give an unitary sensation of smell, are really composed of a number of simpler olfactory sensations. Faded violets, if persistently smelt, soon give but a disagreeable odour of faded flowers. The initial odour of nitrobenzol is that of heliotrope, this almost immediately gives place to that of bitter almonds; this in turn gives place to benzene; then follows complete exhaustion for all three odours. Observations of this nature seem to indicate that the innumerable olfactory qualities, which are experienced as simple and unitary in everyday life, are in reality compounded of a comparatively small number of elementary olfactory qualities, probably about eleven.

The practical experience of everyday life affords instances of the compensation or neutralization of one smell by another. The odour of sanitas is antagonistic to that of fæces, the scent of areca-nut to that of carious teeth and the odour of carbolic acid to that of pulmonary gangrene. On the other hand, there is evidence of olfactory contrast between indiarubber and balsam of tolu or cedar-wood, and between fæces and musk. Epicures also recognize a contrast between the odours of ham and champagne, cheese and claret, game and Burgundy.

The Sense of Position and Movement.

The sense of position and movement is made up of a large number of sensations; mainly muscular, tendinous and articular.

Sandow's exerciser is a useful piece of apparatus for demonstrating the difference between these three kinds of sensation. The dumb-bells should be connected together by a couple of elastic bands. Place the foot upon one dumb-bell and stand upright with the other dumb-bell held in the hand, the elastic bands being put on the stretch. The sensation of tendinous strain will be noticed. Now stoop, so as to relax the tension of the elastic bands. At the moment of complete relaxation there will be noticed a distinct jog due to the approximation of articular surfaces. Now stand upright once more and flex the arm to a right angle. The characteristic sensation of muscular contraction will be noticed in the region of the biceps.

If the front of the forearm be rendered anæsthetic by means of an ether spray, it can be demonstrated that there is no difference between the sensations of voluntary muscular contraction, *e.g.* of the flexor indicis, muscular contraction due to electrical stimulation, and deep pressure upon the muscle. From this it is to be inferred that muscular sensations are due to squeezing of the muscle-spindles (the sensory end-organs of muscle) during muscular contraction.

It is a matter of controversy how great a part is played in the perception of movement and position by each of the above sensation qualities. At the present time, the claims of articular sensation are rather in the ascendant, since Goldscheider has demonstrated that, when a joint is rendered artificially anæsthetic, movement becomes much less perceptible, whether it be active or passive. But we shall have occasion to deal with this subject more fully in the next chapter.

CHAPTER III.

PERCEPTION AND IDEATION.

In the previous chapter we have been considering the elementary sensations which constitute consciousness, without any reference to the external objects which, under normal circumstances, give rise to those sensations. We now advance one step nearer to the everyday working of mind and consider it in its relation to things-in-themselves.

When I have an object before me, *e.g.*, an orange, see it, perhaps feel it and know that it is an orange, I have a *percept* of it; when I *think* of an orange, I have an *idea* of it. We shall see later that there is practically no psychological difference between the two conditions, their chief difference being physiological.

When I hold an orange before me, I experience sensations of pressure, coldness and yellowness. If I drop it on the table, there is a sensation of sound (a thud). If I eat it, there are sensations of sweetness and sourness, and the characteristic flavour apprehended by the sense of smell.

When I *think of* some particular orange which I have seen, I think of it in terms of these or some of these various sensations of pressure, coldness, yellowness, flavour etc.; and, as a matter of fact, I experience these sensations in a slight degree. There is a faint visual, olfactory and tactile image of the orange, a revived percept. I may further experience faint visual and auditory images of the word 'orange', as well as a muscular sensation about the tongue similar to that felt when I say the word 'orange', the so-called 'kinæsthetic equivalent'.

Three points are to be noted at this stage. In the first place, these various sensations are not apprehended as separate: they combine in the unitary percept or idea 'orange'; and it is only

by our psychological analysis, by introspection, that we have discovered that the percept or idea consists of sensations of various sense-modalities.

Secondly it is to be observed that not all combinations of sensation will form a percept or idea. For example, the sense-qualities cold, red, sweet, high-pitched and painful refuse to combine to form an idea.

Lastly perception and ideation localize an object and give it a definite shape, occupying a certain amount of space. It follows that our percepts and ideas are in reality but abstractions, just as much as sensations are. We cannot perceive or ideate an object without giving it shape and placing it somewhere in space with an environment of its own; and this environment is an essential part of our perception. When we have a percept of an object, we are in reality making an abstraction from our general perception of space.

The Physical Basis of Perception.—From the study of word-perception we learn that the physical basis of visual perception is the angular gyrus, and that of auditory perception the second temporo-sphenoidal convolution; but whereas the function of word-perception is limited to the left hemisphere (in right-handed people), both hemispheres participate in the perception and ideation of objects other than words (see p. 92). From clinical and experimental observations, the physical bases of gustatory and olfactory perceptions have been localized in the limbic lobes, and tactile perception has been localized in the post-central convolutions (parietal association-areas) of the two sides. Broadly stated, the faculty of perception is localized in the association areas of the two cerebral hemispheres.

The physiological difference between perception and ideation is that percepts are aroused by stimulation of the corresponding sensory end-organ, while ideas are aroused by way of association. Take, for example, the domain of vision. When I perceive a brick my angular gyri are stimulated by way of the retina; when I *think of* that brick, they are stimulated by way of association fibres, from the left temporal convolutions if I hear the brick spoken of, from the left angular gyrus itself if I have seen the word ' brick '.

SPACE-PERCEPTION.

Some psychologists believe the spatial idea to be innate. This appears to be an unnecessary hypothesis. The new-born child has but to experience movement of its own limbs and of objects in its environment, and the foundation of the extensive idea is already laid.

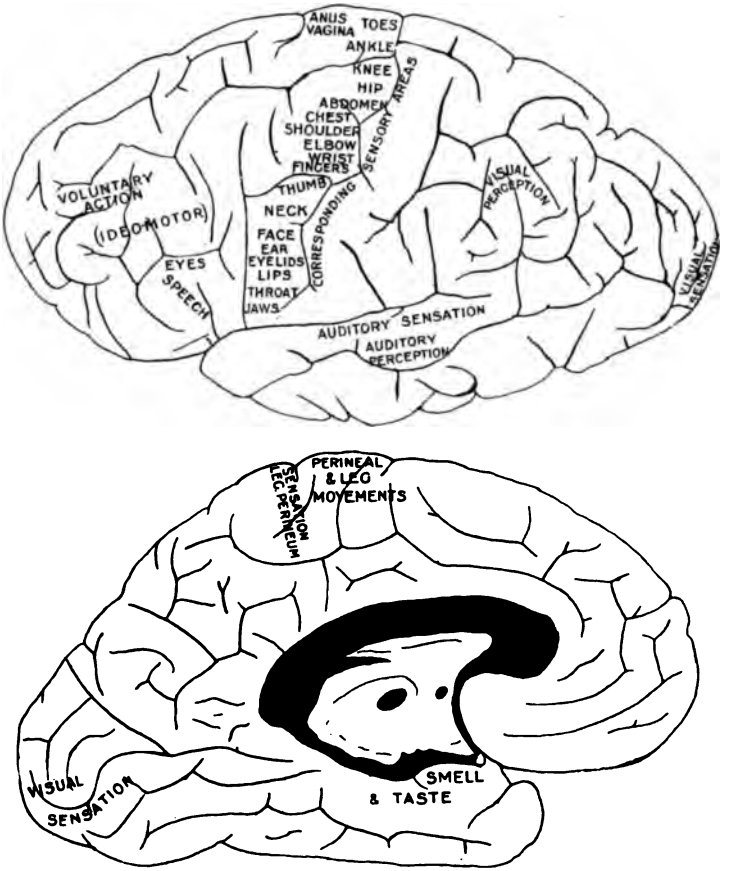


FIG. 5.

The foundation being laid, the development of the spatial idea depends mainly upon our *experience* in the domains of vision, touch, muscular sense and static sense. It now becomes our duty to ascertain in what manner these various senses contribute to our idea of spatial extent.

Visual Space-Perception.

We have already stated that the retina varies all over its surface in the mode in which it reacts to colour. This characteristic gives each small portion of the retina its 'local sign', as it has been called; and it is by means of these local signs that we are enabled to recognize in which part of the visual field a given object is situated. It has been suggested that the situation of the object is not ascertained by movement of the eye, because it is possible in a dark room to localize with exactitude an electric spark, which is of such brief duration as to give no time for eye-movement. On the other hand it has been observed, especially in young babies, that stimulation of any portion of the retina by a light produces a reflex movement of the eye, such as to bring the image of the light to the yellow spot; and in the above experiment a reflex eye-movement may occur after the disappearance of the electric spark, this eye-movement contributing to the knowledge of the situation of the spark.

Although the visual sensations aroused by objects in the external world are produced by stimulation of the retina, we do not localize an object giving rise to a visual image in the neighbourhood of the eye; we refer it to some situation in our environment. This has been magnified by some psychologists into a special faculty of mind, 'eccentric projection', whereby our mental states are, as it were, thrown outwards into the world of experience. Others again minimize the fact, asserting that visual sensations are not associated with eye-sensations. To the present writer, introspection shows that visual sensations are associated with muscular sensations about the eye and that these contribute considerably to the spatial idea. But in whatever way we regard this mental state, there is no doubt that we have a *something-there* feeling superadded to the crude sensations and that we place ideational content in them.

The two eyes regard the world from different points of view. Consequently there is a difference between the images produced upon their respective retinæ. This will be rendered evident if the reader look over the edge of this book at the pattern of the carpet beyond and close alternately his right and left eyes. The study of this fact, especially by the aid of the stereoscope, throws much light on the psychology of perception.

Now although there is a different picture for each eye, we do not experience two percepts, but one. There is a tendency to combine any number of sensations given in consciousness into one idea, and this tendency, which is known as the ' unity of ideation ', may be shown by means of the stereoscope to be very strong. For example, if there are placed in the stereoscope two circles of slightly different diameter, one for each eye, we see one circle of medium size. If instead of the circles there are two horizontal lines, one for each eye, and one slightly above the level of the other, the two lines fuse into one, midway between the levels of the original two.

But, as we have already seen, not all combinations of sensations will fuse to form a single idea. If, for example, a slide similar to Fig. 6 be placed in the stereoscope, we do not see a

FIG. 6.

solid cross, but we see one of the lines crossing the other and obliterating it at the point of intersection.

Fig. 7 gives a most puzzling result. Far from giving an unitary percept, the different parts of the letters keep chasing

FIG. 7.

each other out of the field. These are examples of ' ideational rivalry '.

We now proceed to the stereoscopic figures, which show how binocular vision gives the idea of depth.

In Fig. 8 we see two dots, the right being more distant than the left.

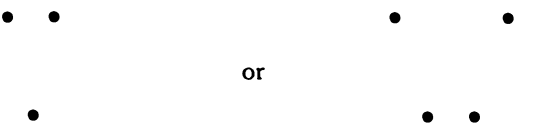


FIG. 8.

Fig. 9 is seen as a single line, with the upper end nearer to the observer than the lower.

FIG. 9.

Fig. 10 is seen as two circles, one in the middle of the other, but nearer to the observer. In other words, it appears as a truncated cone viewed from above.

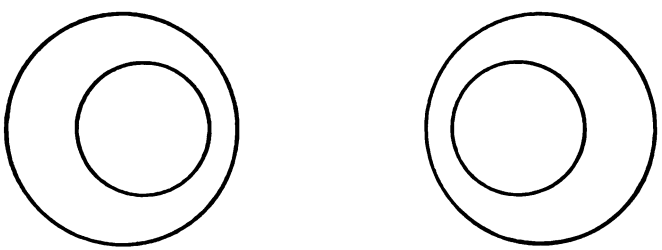


FIG. 10

Fig 10A appears as a hollow truncated cone viewed from below.

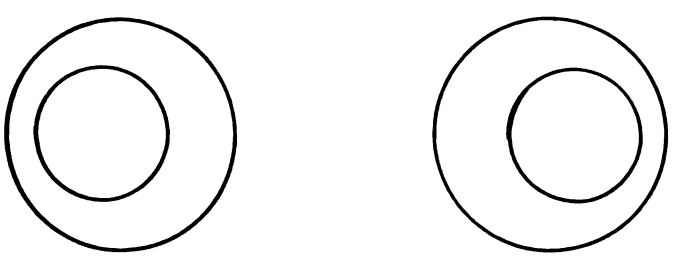


FIG. 10A.

Fig. 11 appears as one line curved toward the observer as in looking down on an old-fashioned croquet-hoop.

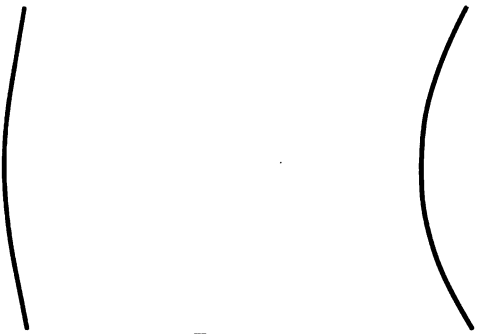


FIG. 11.

In considering these various results it will be seen that there is a tendency on the part of the organism to attach ideational content to these groupings of sensation. If we place two marbles horizontally in front of the eyes in such a way that the right marble is farther off than the left, we have the conditions of

FIG. 12.

Fig. 8, the marbles appearing when viewed with the left eye to be closer together than when viewed with the right; and we have the conditions of Fig. 9 if the upper end of a stick be tilted towards us. To the left eye it will appear to lean to the right, and to the right eye to lean to the left.

On the other hand, conditions never occur in the world of perceptual experience in which an object appears to one eye to be horizontal and to the other vertical : hence, we are unable to combine the images of Fig. 6 or Fig. 7 into a single percept.

The tendency to attach ideational content to images is further illustrated by some of the geometrical illusions. The angles of perceptual experience are for the most part right angles ; there is consequently a tendency to assimilate all angles to a right angle and hence to overestimate acute angles and to underestimate obtuse angles. When looked at with one eye, so as to eliminate the true idea of depth gained by binocular vision, Fig. 12 appears as a vertical line in the plane of the paper crossed at right angles by a line passing through the plane of the paper, especially if an extremity of the latter line be fixated.

The illusions in the following figures are adduced to illustrate the part played by muscular sensation in the estimation of space.

FIG. 13.

Although *a* and *b* are the same length, *b* looks longer than *a* ; the interpretation being that there is more muscular effort required to carry the eye along *b*, with all its interruptions, than along the uninterrupted *a*. The same explanation applies to the illusions in Fig. 14.

FIG. 14.

In Fig. 15 the horizontal and vertical lines are of equal length, but the vertical line appears the longer because there is more musculature brought into play in moving the eyes up and down

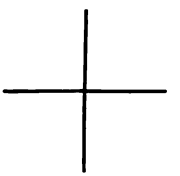
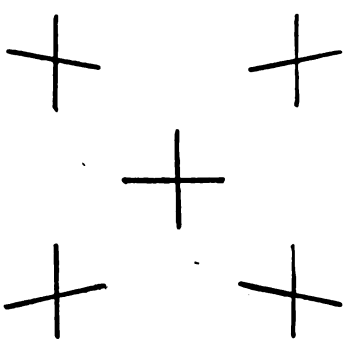


FIG. 15.

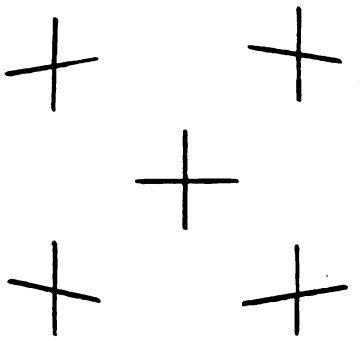
than in moving them laterally. Similarly although the lines are exactly bisected, the upper half of the vertical line appears longer than the lower half, because the muscles which move the eye upwards are not as well developed as those which move it downward. Looked at with one eye, the outer half of the horizontal line appears longer than the inner half, because the external rectus is not so well developed as the internal rectus, and therefore more effort is required to move the eye outward than to move it inward.

The general conclusion from all these considerations is that we tend to attach to any group of sensations the content of some idea, which has resulted from our experience of ' things ' as they are usually presented to us. But there is yet one more illusion



After-images of a right-angled cross.

FIG. 16.



Perspective of a right-angled cross.

FIG. 17.

of the greatest interest which demands our attention, as illustrating this point and also the effect of muscular movement in determining the nature of our perceptions.

Let the reader obtain an after-image of a right-angled cross placed horizontally in front of the eyes. He will find that the shape of the after-image is changed as shown in the accompanying diagram (Fig. 16), when he turns the eyes upward or downward to the right or left. The explanation of this illusion depends upon the perspective of a right-angled cross. If a real cross be situated in the four corners of the visual field, it gives the appearance represented in Fig. 17.

Now ' the brain ' has nothing to do with after-images ; it simply endows the sensations which it experiences with ideational content ; and ' the brain's ' experience is that a line, in

any of the four corners of the field of vision, which projects a horizontal image on the retina, is not horizontal but tilted away from the centre as in Fig. 17. Hence results the torsion of the horizontal line in the after-image of the right-angled cross. The reader may convince himself of this torsion by facing one of the walls of his room, and looking upward to the right and left at the line formed by the junction of wall and ceiling, and of wall and floor.

This furnishes additional evidence of the tendency to attach ideational content to sensations. It is also an excellent illustration of the fact that ideas may be altered by the addition of movement sensation to the content of consciousness.

We have seen that binocular vision plays a large part in the estimation of distance. The muscular sensations caused by the effort of convergence contribute very materially to the spatial idea. We are helped, too, by noting the amount of effort at accommodation, the amount of eye-movement required to pass several objects in review, the relative size of objects and the relations of their bases. Other indications of distance are uniformity and paleness of colouring, and the indistinctness of boundary lines.

Cutaneous Space-Perception.

It has been observed that the skin, on examination, presents areas of sensitivity to pressure, pain, warmth and cold. Now if we were to draw up a map of the whole of the cutaneous surface, a map based upon the distribution of these various sensitive areas, we should find that no two parts of the map exactly resembled one another. In other words, every portion of skin has its local characteristics ; and it is by means of these local characteristics that we are enabled to determine the portion of skin stimulated at any time. We localize cutaneous sensations by means of their 'local sign', in the same way as we localize retinal sensations by means of their 'local sign'. We are not always quite accurate, however, in the localization of a cutaneous sensation. For example, stimuli are not well localized in the long axis of a limb ; and with regard to transverse localization, there is less accuracy on the outer than on the inner side of a limb. There is also a large amount of error in parts of the skin which one does not see, *e.g.*, the middle of the back.

All parts of the skin are not equally capable of feeling as double the stimulus given by a pair of compass-points. In some parts the two points may give rise to one sensation, in other parts to two. For example, at the tips of the fingers the two points can be distinguished when they are but two millimetres apart, but in the middle of the back they are apprehended as one stimulus if they are less than 60 millimetres apart.

Articular Space-Perception.

It has been shown by Goldscheider that our perception of the position, attitude and movement of our limbs is dependent on sensations arising in the articular surfaces of their joints; since articular anæsthesia, artificially induced by faradism and other means, almost completely abolishes such perception. The muscular sense, which hitherto has been credited with this function, has very little to do with it; the function of the muscular sense appears to be almost solely the appreciation of weight.

The greater the velocity of movement of a limb, the smaller is the movement which can be perceived. The following table, quoted from E. W. Scripture, gives the just perceptible movement around the various joints for the greatest velocity obtainable without jarring. The figures indicate degrees:

Second interphalangeal	1·03 to 1·26
First interphalangeal	0·72 ,, 1·05
Metacarpo-phalangeal	0·34 ,, 0·43
Wrist	0·26 ,, 0·42
Elbow	0·40 ,, 0·61
Shoulder	0·22 ,, 0·42
Hip	0·50 ,, 0·70
Ankle	1·15 ,, 1·30

Static Space-Perception.

All the above forms of space-perception contribute to our knowledge of the position of our body in space; but we are provided with yet another sense, by which we are enabled motorially to orientate the whole body. The labyrinth, consisting of the otolith organ and the semicircular canals, is an arrangement by which we become aware of change of position or change of movement of the head, and therefore of the whole body. It is owing to changes of pressure of the labyrinthine fluid

and the otoliths against the walls of the labyrinth that we feel the rolling of a ship or the starting of a lift.

It has been found that, when a person is placed in a closed chamber capable of being rotated on a vertical axis, he experiences a sensation of being rotated only at the beginning of rotation or during alteration of the velocity of rotation. As long as the velocity remains constant, the chamber appears to him to be still. When however the rotation ceases or the speed is decreased, he feels as if he were being rotated in the opposite direction. He can demonstrate to himself in the following way that the sense-organ by which he experiences this sensation is within the head. If he bend his head forward, the axis of rotation appears to bend forward too ; and if he bend his head sideways at a right angle, as if to rest it on one shoulder, he feels as if he were rotating on a horizontal axis parallel to the line of the shoulders.

It has further been shown that the labyrinth is the receptive organ for the reflex tonic contraction of the muscles of the body, whereby it is maintained in any given attitude. As you sit reading these pages, without any effort on your part the reflex tone of your muscles maintains your body in an attitude entirely different from that of a corpse placed in the same position, whose toneless muscles would allow the various parts of the body to succumb to the influence of gravity. Ewald has shown that each labyrinth maintains the tone of the muscles of the same side of the body, especially those of the neck and trunk, and the extensors and abductors of the limbs. As Sherrington remarks in his book 'On the Integrative Action of the Nervous System', the effect of the 'knock-out' blow on the point of the chin in reducing a vigorous athlete to a toneless mass of flesh, whose weight alone determines its attitude, is due to concussion of the labyrinths. But this is a digression. So far as space-perception is concerned, the labyrinth serves to indicate to us changes in position of the body as a whole.

Auditory Space-Perception.

The localization of sound is much less accurate than that of cutaneous and retinal stimuli. It is assisted by movements of the head ; but even if the head be held perfectly still, we are able to estimate the direction of a sound with a fair degree of accuracy.

Under experimental conditions, it has been shown that sounds are best localized when they are on the same level as the ears. There is no confusion, as a rule, between right and left ; but mistakes occur in estimating whether a sound is in front or behind. Localization is rather more accurate in front than behind. It appears probable that sound is localized by means of pressure stimuli communicated to the hairs of the pinna, since localization is very inaccurate if the pinnæ be strapped back against the side of the head or if an obstacle to sound be tied to each side of the head in front of the pinna.

TIME-PERCEPTION.

The study of auditory perception throws light not so much on our ideas of space as on our ideas of time.

When listening to music, we find that it is arranged according to a certain time or rhythm. Similarly when we listen to a series of monotonous sounds, they appear to arrange themselves in a certain rhythm. If, for example, we listen to the clicks of a metronome, they seem to fall into pairs or threes, or into pairs of twos or threes ; or they may be arranged thus :

FIG. 18.

or even thus :

FIG. 19.

If we listen to a metronome in some such way as this, and, without counting, endeavour to discover how large a group can be apprehended as a single idea, we find that under certain circumstances an unitary idea can be formed consisting of as many as forty-eight clicks, provided they succeed each other with sufficient rapidity, the whole series occupying less than twelve seconds. In this manner, we find that our maximum perceptual unit of time is about twelve seconds.

Now if at any time we endeavour to think of the present moment in contradistinction to the past or future, we find that it is gone before we have had time to think. The present is always immeasurably short; it is indeed nothing but a moving boundary-line separating the past from the future. Now, as a matter of experience, we include in our practical cognition of the present a short period of the immediate past. The existing unit of time, as thus conceived, has received the name of 'the specious present', and the metronome has taught us that such an unit may be as long as twelve or even fourteen seconds. These units are not separate from one another, but perpetually and constantly overlapping.

If, when we are engaged in conversation, the clock should happen to strike and occupy in striking less than one perceptual unit of time, we can usually say how many strokes occurred without having counted them or even attended to them; but we are unable to do this if the striking has occupied more than one perceptual unit of time, *i.e.* more than twelve seconds. Indeed, it sometimes happens, under these circumstances, that a person present remarks 'That clock only struck nine' when the clock struck eleven. This affords an excellent practical illustration of the 'perceptual unit of time'.

Inasmuch as we are unable to give a name to each such perceptual unit, any given unit is identified with some incident (psychologically speaking, with some percept). In the absence of any percept of greater interest, we fix upon the fact that the hands of the clock point in certain directions. In this latter case the time-percept is clearly identified with a space-percept. And when a mother tells us that a certain event took place 'the year that Willie was born', she is making an abstraction from the Willie's-birth idea.

The point which I wish to emphasize is that the temporal relations of a percept are an essential part of the percept itself; and similarly the temporal relations of an idea are an essential part of the idea. In the case of a percept, there is always a feeling of 'now-ness'; and in the case of an idea, the revival of a specific percept, there is a feeling of 'then-ness'. The Willie's-birth idea is incomplete if the feeling of 'then-ness' be abstracted from it, if temporal relations be absent from the ideational content.

This is one way in which an idea differs from a percept. The

other is that a perceptual image is clear and strong, whereas an ideational image, at least with most people, is indistinct and faint.

CONCEPTION.

When, from a number of percepts or ideas, an abstraction of some quality or series of qualities is made, and the qualities are recombined, the result is a concept. In this sense, the colour 'orange' is a concept. The colour of the fruit is abstracted from a large number of orange-ideas, and the result of the recombination of these colours is the concept of the colour 'orange'. And if, from any number of orange-ideas we abstract all the qualities—the yellowness, roundness, sweetness, acidity, odour, coldness, softness etc., and recombine them, we have as a result a conceptual orange. Observe that an orange-idea is the revived percept of a particular orange, and that an orange-concept is a recombination of the qualities of a large number of revived orange-percepts.

It will also be observed that the feeling of past time, the feeling of 'then-ness' as I have called it, is not such an essential part of a concept as it is of an idea. This must not be construed into meaning that the absence of the feeling of 'then-ness' is an essential attribute of a concept. The conception of concrete things is very closely related to ideation and therefore is frequently associated with a feeling of past time. When I form a concept from the various oranges which I have seen growing on the trees in Italy, the feeling of 'then-ness' is insistent.

Since conception is the abstraction and recombination of the qualities of a number of ideas; such abstractions as truth, virtue, health, happiness and honesty must be regarded as concepts. From such abstractions the feeling of past time is usually absent. If we abstract from our total number of ideas their spatial qualities and recombine them, we have as a result 'conceptual Space'; and if we abstract their temporal qualities and recombine them, we have as a result 'conceptual Time'. 'Boundless Space' and 'Eternity' are examples of conceptual Space and conceptual Time.

IDEATIONAL TYPE (OFTEN CALLED MEMORY-TYPE).

We have seen that the idea of an object is made up of sensations derived from various sense-modalities, visual, auditory, tactual, olfactory, gustatory and kinæsthetic, as well as of sensations connected with the name of the object; and these again may be visual, auditory or kinæsthetic (muscular sensations connected with the pronunciation of the name). Some of them play a much greater part in the idea of an object than others; and the particular sense-modality which plays the greater part differs in different individuals. If a person's idea of an orange is usually visual his ideational type is visual; if olfactory, then his ideational type is olfactory; if he thinks of an orange in the terms of the written or printed word 'orange', his ideational type is verbal-visual; if he thinks of it in terms of the sound of the spoken word 'orange', his ideation is of the verbal-auditory type; and if he thinks of it in terms of the 'kinæsthetic equivalent', the word 'orange', as it feels to him in his mouth when he says it, his ideation is of a verbal-motor type.

There are several methods of investigating the ideational type of an individual. Perhaps the best method is that of the questionary which consists of a series of questions, bearing upon the point and to be answered by persons under investigation. As I believe that the determination of an ideational type might be of some importance in the examination of the insane, I will give in detail a questionary from Titchener's 'Experimental Psychology':

'1. Think of a bunch of white rosebuds, lying among fern-leaves in a florist's box.

(*a*) Are the colours—the creamy white, the green, the shiny white—quite distinct and natural?

(*b*) Do you see the flowers in a good light? Is the image as bright as the objects would be if they lay on the table before you?

(*c*) Are the flowers and leaves and box well-defined and clear-cut? Can you see the whole group of objects together, or is one part distinctly outlined while the others are blurred?

(*d*) Can you call up the scent of the rosebuds? of the moist ferns? of the damp pasteboard?

(*e*) Can you feel the softness of the rose-petals? the roughness of the ferns? the stiffness of the box?

(*f*) Can you feel the coldness of the buds as you lay them against your cheek?

(*g*) Can you feel the prick of a thorn? Can you see the drop of blood welling out upon your finger? Can you feel the smart and soreness of the wound?

(*h*) Can you call up the taste of candied roseleaves? of candied violets? salt? sugar? lemon-juice? quinine?

2. Think of some person who is well known to you, but whom you have not seen for some little time.

(*a*) Can you see the features distinctly? the outline of the figure? the colours of the clothes?

(*b*) Can you hear the person's voice? Can you recognize your friends by their voices? Can you call up the note of a musical instrument in its appropriate clang-tint: piano, harp, organ, bassoon, flute, trumpet? Can you hear, in imagination, a note that is too high for you to sing?

Think of the playing of an orchestra. Can you hear two different instruments playing together? More than two? Do the tones ring out in their natural loudness? Do they come to you from their natural places in the orchestra?

(*c*) Can you hear, in memory, the beat of the rain against the window-panes? the crack of a whip? a church bell? the hum of the bees? the clinking of teaspoons in their saucers? the slam of a door?

(*d*) Can you see the person in familiar surroundings? Can you see more of these surroundings—*e.g.*, a room—than could be taken in by any single glance of the eyes? Can you mentally see more than three faces of a die, more than one hemisphere of a globe, at the same instant of time?

(*e*) Do you possess accurate mental pictures of places that you have visited? Do you see the scenes and incidents described in novels and books of travel?

(*f*) Are numerals, dates, particular words or phrases, invariably associated in your mind with peculiar mental imagery (diagrams, colours)? Are certain sounds always connected with certain colours? Have you any other constant associations from different sense-departments? Have you a special gift or liking for mental arithmetic or mechanics? Can you lay a plane through a cube in such a way that the exposed surface shall be

a regular hexagon? through an octahedron? Have you ever played chess blindfold? Explain fully how far your procedure in these cases depends on the use of visual images.

3. Think of the National Anthem.

(*a*) Can you see the words printed? Can you hear yourself say or sing them? Can you hear a company singing them? Can you feel yourself forming the words in your throat, and with your lips and tongue? Can you hear the organ playing the air?

(*b*) Do you recall music easily? Do you "make up tunes in your head" when you are thinking steadily or in reverie? Does imagined music take any considerable part in your mental life—*i.e.*, do airs and motives and snatches play or sing themselves to you during the various occupations of the day? Have you an "absolute" memory for music—*i.e.*, can you identify a note that is struck upon the piano keyboard, or tell the pitch of a creaking door?

(*c*) Partly open your mouth and think of words that contain labials or dentals: "bubble", "toddle", "putty", "thumping". Is the word image distinct? Can you think of a number of soldiers marching without there being any sympathetic movement or movement-feel in your own legs? Think of getting up from your seat to close the door. Can you feel all the movements? as intensively as if they were really made?

(*d*) Are you stirred or moved as you think of words or music of the anthem? Are you affected in this way at the theatre, or when reading novels? Do you choke or cry (or feel like crying) as you read—*e.g.*, of Colonel Newcome's death? When you think of your childish terrors, or of your childhood's injustices, do you feel over again the fear and resentment?

(*e*) If you see an accident—the crushing of a limb or the catching of a finger in the door—do you yourself feel the blow or the bruise? Does the sight make you shiver, give you "goose flesh"? Do you pant or hold your breath as you watch a difficult feat of climbing or trapeze-work? Can you, in general, call up organic sensations: hunger, thirst, fatigue, feverishness, drowsiness, the stuffiness of a bad cold?

4. Arrange the following twenty experiences in groups, according to the clearness, vividness, and distinctness with which you can remember or imagine them.

(*a*) A gloomy, clouded sky; a sheet of yellow paper; a black circle on a white ground.

(*b*) The feel of velvet ; of dough ; of a crisp dead leaf.

(*c*) The smell of tar ; of a fur coat ; of an oil-lamp just blown out.

(*d*) The taste of chocolate ; of olives ; of pastry.

(*e*) The warmth of a hot-water bag at your feet ; the cold of a piercing wind that cuts through your clothing.

(*f*) Singing in the ear ; the buzz of an induction-coil vibrator ; the preliminary A of a violin.

(*g*) Nausea ; toothache ; pins and needles.

5. Give any supplementary information that occurs to you on the topics of this questionary. Do you recollect what your powers of visualizing, etc., were in childhood ? Have they varied much within your recollection ? What difference do you find between a very vivid mental picture called up in the dark and a real scene ? Have you ever mistaken a mental image for a reality when in health and wide awake ? Are the characteristics of your mental imagery repeated in other members of your family ? Have you a good command of your images ? Etc., etc.'

The questions should not be answered merely by ' Yes ' or ' No '. It is best to use the following terms from Galton's ' Table for Vividness of Mental Imagery ' :

' Highest : Brilliant, distinct, never blotchy.

First suboctile : The image once seen is perfectly clear and bright.

First octile : I can see my breakfast-table or any equally familiar thing with my mind's eye quite as well in all particulars as I can do if the reality is before me.

First quartile : Fairly clear ; illumination of actual scene is fairly represented. Well defined. Parts do not obtrude themselves, but attention has to be directed to different points in succession to call up the whole.

Middlemost : Fairly clear. Brightness probably at least from one-half to two-thirds of the original. Definition varies very much, one or two objects being much more distinct than the others, but the latter come out clearly if attention be paid to them.

Last quartile : Dim, certainly not comparable to the actual scene. I have to think separately of the several things on the

table to bring them clearly before the mind's eye, and when I think of some things the others fade away in confusion.

Last octile: Dim, and not comparable in brightness to the real scene. Badly-defined, with blotches of light; very incomplete; very little of one object is seen at one time.

Last suboctile: I am very rarely able to recall any object whatever with any sort of distinctness. Very occasionally an object or image will recall itself, but even then it is more like a generalized image than an individual one. I seem to be almost destitute of visualizing power as under control.

Lowest: My powers are zero. To my consciousness there is almost no association of memory with objective visual impressions. I recollect the table, but do not see it.'

On comparing a large number of results obtained by this and other methods, it has been found that the visual type is by far the commonest. Next in order comes the verbal-motor type. Scientific men are as a rule bad visuals, because their thought is so much engaged in concepts and other abstractions. The author's ideational type has quite distinctly changed from the visual to the verbal-motor. In trying to court sleep by the old device of watching sheep jump over a gate, the sheep and the gate used to be quite clear and distinct; but now it is quite impossible to see them. A faint outline of the middle of the gate may occasionally appear, but the sheep refuse to make their appearance.

CHAPTER IV.

ASSOCIATION OF IDEAS.

IDEAS have been distinguished as simple and compound. When I think of a brick, I have a simple idea ; when I think of a particular house, I have a compound idea comprising a number of brick-ideas, window-ideas etc. ; and when I think of a particular village, I have a compound idea comprising a number of house-ideas. Now we have already observed that the simple idea never occurs in actual experience. A brick is always perceived in connection with its temporal and spatial surroundings ; and when a brick is recalled in ideation ideas, of other objects in spatial or temporal relationship with the brick tend to be recalled with it. If some quality or qualities of the brick-idea be abstracted, they tend to become attached to other ideas with different temporal and spatial surroundings. For example, the redness of the brick may recall the redness of an omnibus going to the City.

These are examples of the ' association of ideas ', and such associations may be classified as follows :

Associations by similarity.

Associations by contiguity—

(*a*) In space.

(*b*) In time { simultaneous associations. / successive associations.

An ordinary train of thought depends on the association of ideas. If I think of having attended a certain concert, I perhaps recall one of the songs which was about a bird ; a similarity association next causes me to think of birds at the Zoological Gardens ; a contiguity association arouses the idea of a friend who accompanied me on my last visit to the Gardens ; a similarity association arouses the idea of Sherlock Holmes, and I think of crime, etc. But why, instead of this train of thought,

do I not form a continuous series of temporal-contiguity associations, and think of the friend with whom I walked home after the concert, of the letters I read when I entered the house, of my breakfast next morning and so on, by a process which has been termed 'impartial redintegration'? In other words, what is it which determines the association of one idea rather than another with the idea already in consciousness? This question has been answered by reference to experiments with the memory apparatus.

The memory apparatus consists of an upright board with a couple of rectangular apertures in it side by side, through which pairs of cards may be exposed for short periods of time. In working with it, the observer sits opposite the windows of the board while the experimenter works the cards. A typical experiment is carried out somewhat as follows: There are two series of cards for each window: one series is coloured, the other is white, with a letter of the alphabet printed on each card. Pairs of cards are presented to the observer's gaze, *e.g.*:

Red	M
Purple	J
Yellow	Q
Green	D
Red	Y
Brown	L
Yellow	Q
Violet	K
Green	S

If a number of such series be presented to the observer and single members of the series be subsequently given for him to name the association he has formed with each of them, it is found that the association of one idea with another depends on: (1) The frequency and (2) the recency of their previous connection, (3) the relative vividness of the previously connected ideas, and consequently the degree of attention aroused by them and (4) the relative position in the series of the previously connected ideas; this depends also upon the degree of attention aroused. For example in the above series, it is found that the tendency to associate yellow with Q is strong on account of the frequency of the connection; green is associated with S rather than D, because the S-green connection is more recent; red is associated with M rather than Y, because of the prominent position of the

M-red association (first); the L-brown association is a strong one, because of the vividness of the L-impression, the **L** arrests the attention. These laws are verified in actual experimental work by using a large number of such pair-series with a large number of observers and noting the frequency of right and wrong answers.

In applying these rules to the study of an ordinary train of thought it must not be forgotten that the vividness of an impression may be enhanced by the interest which attaches to it—in other words, by the attention which is paid to it. But for this fact, a logical train of thought would be an impossibility; all trains of ideas would follow a scatter-brained course, as in the example given above.

Cognition, Recognition, Memory and Imagination.

The simplest example of association by similarity is the **cognition** or direct apprehension of an object. When I see a hat its shape at once revives the concept 'hat', and the article is at once cognized as a hat. When I look inside the hat and observe the initials 'W. H. B. S.', I *recognize* the hat as mine. **Recognition** then is a simple example of association by contiguity; but no sharp line can be drawn between cognition and recognition. When I turn a corner of the street and meet my friend Brown, it is a difficult matter to decide whether I *cognize* him as Brown or *recognize* the object, which I have cognized as a man, as Brown, by the contiguity association of the familiar face with the man. Instances of recognition of this latter class have been called 'immediate recognition', in contradistinction to those of the former class (the recognition of the hat) which have been called 'mediate recognition'. Mediate recognition is in reality, an 'association of percepts'.

The process of recognition consists of three part-processes: firstly, there is a percept; secondly, the percept calls up by association secondary ideas of such percept having been previously experienced in different temporal and spatial surroundings and, thirdly, there is a feeling of familiarity dependent, as we shall see later, upon muscular and other organic sensations reflexly aroused.

Memory differs from recognition in that the first part-process is the *revival* of a percept or the presentation of an idea. If,

in the above analysis of recognition, the word 'idea' be substituted for 'percept', we have an analysis of memory into its part-processes. When I *think* of my hat there is a faint image of the hat (not necessarily a visual image); there is a feeling of the image having existed previously and an accompanying emotional tone of familiarity. The image arising under these circumstances has been called the 'memory-image'; all revived percepts are in reality memory-images. The form of memory, corresponding to mediate recognition and dependent on the association of ideas, is usually spoken of as 'associative memory'. Memory then stands in the same relationship to recognition as ideation stands to perception.

Now the process of **imagination** bears the same relationship to recognition and memory as conception bears to perception and ideation. When I read an account of the upper reaches of the Amazon, I imagine the scene by the associative combination of various concepts of forests, rivers, men of colour etc., with various ideas of South American animals and plants derived from descriptions, pictures, museums, zoological and botanical gardens. The scene is imagined by the associative combination of these into a new concept.

There are two varieties of imagination, viz., reproductive and constructive. They differ in the first part of the process. The above is an example of 'reproductive imagination'. Firstly, there is a percept (the printed pages of the book describing the scene); secondly, the percept calls up various concepts and ideas, abstractions from which recombine into a new concept. If, instead of the primary perception, we have an associatively aroused idea, we have an example of 'constructive imagination'. This is the process which stands the poet, the novelist and the inventor in good stead. Æsop's fables, Jules Verne's stories, Coleridge's 'Ancient Mariner' and the invention of the printing-press and the steam-engine are all examples of constructive imagination.

Judgment and Reasoning.

A **judgment** is formed when an abstraction is made from any percept, idea or concept, and the abstraction recombined or associated with the primary percept idea or concept. In other words, a judgment is an association after disjunction. When I

think of gold being yellow, I abstract the yellowness quality from the gold-concept and reassociate the yellowness with the gold.

A judgment is therefore nothing more than a special form of association; the yellowness is merely reassociated with the gold instead of with daffodils, the skin of a Chinaman or what not.

The verbal representation of a judgment is a proposition, *i.e.*, a sentence in which a predicate is affirmed or denied of a subject, a sentence in which 'it is asserted that some given subject does or does not possess some attribute, or that some attribute is or is not conjoined with some other attribute' (J. S. Mill). The proposition corresponding to the above judgment is 'Gold is yellow'.

Reasoning consists of a series of judgments (verbally, a series of propositions) related to one another, the last term of the series being a conclusion dependent, rightly or wrongly, upon the preceding judgments or propositions. The question of legitimacy of inferences, made during a train of reasoning, belongs to the art of logic, as also does the discrimination between true and false propositions.

CHAPTER V.

AFFECTION.

THE word 'affection' is used by psychologists to mean the pleasant or unpleasant tone of feeling which accompanies sensation.

Most persons find unsaturated and intermediate colours more pleasant to look upon than saturated colours: with some observers the reverse is the case. Greys are more pleasant than pure white or black. Tones are more pleasant than noises, and tones of medium pitch than those of very high or very low pitch. Odours of fruits and flowers are more pleasant than those of decaying animal matter. Sweet and salt substances are generally more pleasant to taste than sour and bitter. Moderate warmth is more pleasant than extreme heat or cold. Painful sensations are almost invariably associated with a tone of unpleasantness. Sexual sensations are almost invariably pleasant. Moderate muscular exercise is pleasant, while excessive muscular exertion and enforced rest are unpleasant; and with regard to sensations in general, it may be noted that weak stimuli are, as a rule, more pleasant than strong.

Although sensations are almost invariably accompanied by a tone of feeling, affection is not to be regarded as an attribute of sensation. Affection is, in its essence, a super-added mental state of the individual who experiences a sensation. As I sit by the fire on a frosty day the warmth seems to be in the skin; but the pleasantness of the warmth is the way in which I experience it. Moreover, sensation is more localized than affection. If I knock my shin against a chair in the dark, the sensation is localized in my shin; but the unpleasantness of the pain pervades the whole of consciousness. Again, a tone of feeling tends gradually to disappear, to wear off, while the sensation remains practically unaltered.

sensation and affection differ in yet another way. If we attend to a sensation, it grows clearer and more intense. If we attempt to attend to an affection, the tone of pleasantness or unpleasantness at once disappears. This will be better understood when we have considered the phenomena of attention. For the present it may be noted that attention to the tone of feeling, as such, prevents attention to the sensation which gives rise to it. The sensational accompaniments of affection have therefore been studied, and as a result it has been shown:

1. By the plethysmograph, that a positive tone of feeling (pleasantness) is accompanied by an increase of bodily volume (dilatation of vessels), and a negative tone (unpleasantness) by a decrease.

2. By the pulsimeter, that a positive tone is accompanied by a quickening, a negative tone by an increase.*

3. By the sphygmograph, that a positive tone is accompanied by a fuller, a negative by a shallower.

4. By the [illegible] that a positive tone is accompanied by [illegible] a negative by a decrease.

5. By the [illegible] (or planchette), that a positive tone is accompanied by a reflection of the arm, and a negative by a [illegible].

6. By the [illegible] on the part of the [illegible] that what is pleasant and to [illegible]. A moment's consideration will show that pleasure and pain [illegible] pleasant things repel [illegible]. Affection is the [illegible] sensation and movement. [illegible] the organism [illegible] maintenance of [illegible] tone of unpleasantness [illegible] it bares [illegible] greyhound [illegible] and [illegible] sitting [illegible] species. [illegible] does [illegible]

[illegible]

It has been observed that attention to an affection is an impossibility, and this observation might lead to the inference that introspection can render us but little assistance in elucidating its psychology. We have, however, been using the 'phrase tone of feeling' in discussing the nature of affection. By retrospection, which differs but slightly from, and is in many cases the same thing as, introspection, we find that the phrase 'tone of feeling' is well founded. The affective tone of pleasure or pain is a feeling or sensation superadded to the sensation which gives rise to it. And since we have found that sensations arise from peripheral stimuli, it becomes our duty to look round and see if we can discover any stimuli which may be regarded as the cause of this superadded sensation.

The experimental results obtained in the investigation of affective states by means of the plethysmograph, pneumograph, automatograph etc., supply the required evidence. We find that in affective states stimuli to muscular and circulatory sensations are at work in divers parts of the body. The inference is that these give rise to the superadded sensations which constitute the feelings of pleasure and pain. The dilatation of arterioles, the increased pulse-frequency, the deepened respiration and the arm abduction are motor phenomena which take place involuntarily. Indeed we should not have known that they occurred but for experimental observation. They are, therefore, to be regarded as reflexes.

From the above considerations, therefore, we learn that the feelings of pleasure and pain are due to muscular and circulatory sensations, which result from a complicated reflex action, and that the intrinsic nature of these feelings has developed as a natural consequence of the struggle for existence.

Emotions, Passions, Moods and Temperaments.

Now the tone of feeling which attaches to a percept is of a much more complex nature than that which attaches to a simple sensation, and it has a very much larger number of varieties. These are known as the **emotions.** An emotion is the tone of feeling which attaches to a percept, idea or concept; and inasmuch as the colour of the emotion differs with almost every possible percept, idea and concept of things, people, incidents and situations, a satisfactory classification of the emotions is

practically an impossibility. The feeling of attraction towards people and things may take the form of interest, familiarity, intimacy, reverence or love. Repulsion may take the form of dislike, disgust, antipathy, contempt, repugnance, disdain, hatred or anger. Ideas of welfare may be associated with feelings of satisfaction, gratitude, contentment, joy, hope or anticipation; ideas of harm with feelings of sorrow, grief, dissatisfaction, resignation, despair, fright or horror. If the ideas are of the welfare or injury of others, we may have feelings of gratification, gladness, envy, jealousy, regret, care or sympathy. Yet all these take no account of such feelings as those of effort, misery, decision, defiance, pride, shame and mirth. Indeed, every mental operation has its emotional element. Such processes as recognition, comparison, discrimination, judgment and reasoning have a characteristic feeling attached to each of them, and this should not be omitted in a complete description of any of these processes.

In attempting a study of the emotions we are met with the same difficulty as in the study of affection; the emotion is gone as soon as attention is directed to it. By a careful series of retrospections, however, we can arrive at the conclusion that an emotion consists of a number of sensations and that these sensations are derived from the activities of certain muscles (voluntary and involuntary) and glands (sudorific, lachrymal, intestinal etc.). The activities of involuntary muscles give rise to certain circulatory changes, such as increased or diminished frequency of the pulse, as well as to local flushings and pallors.* The more we investigate the matter, the more we become convinced that these sensations are the very essence of emotion. Let the reader conjure up some emotion, and note the various

* Dr. Sherrington has sought to exclude circulatory and other visceral changes from the physical basis of emotion. Choosing a dog which was especially liable to violent outbursts of rage, joy, disgust and other emotions; by appropriate spinal and vagal transection he removed completely all sensation from the viscera. Yet the dog continued to give evidence of emotion by retraction of the upper lip, pressing backward of the ears, growling etc. This experiment does not prove that visceral sensations, as Dr. Sherrington suggests, contribute nothing to emotional feeling. The dog expressed emotion by and experienced emotion from contraction of its facial muscles, because spinal transection could not possibly interfere with these facial reactions; but there is no proof that the emotional feeling of the dog was not diminished by the removal of its visceral sensations.

sensations which he experiences in connection therewith. Then let him divest the emotional feeling of all these bodily sensations, and he will find that there is no part of emotional feeling left.

The various activities which give rise to the emotions are also responsible for their expression. The expression of an emotion is that movement or complex of movements occurring in an individual which indicates to others the nature of his emotion.

In the emotions accompanying pleasant ideas there is an increase of muscular tone and power, with a tendency to abduction of the arms; a decrease of pulse-frequency, with general dilatation of the arterioles; and an increase of the frequency and depth of respiration. In the emotions accompanying unpleasant ideas we have the reverse bodily conditions. This much we have already learned in our study of affection; but in addition to these physical signs, there are many others in the various emotions, each complex of physical signs giving rise to that expression which is characteristic of the particular emotion. In anger there are contraction of the corrugatores superciliorum, fixation of the gaze, dilatation of the nostrils, tightening of the lips, grinding of the teeth, clenching of the fists, extension of the trunk and flushing of the face. In disdain there is contraction of the levator labii superioris alæque nasi. In fright, the mouth and eyes are widely opened; there are extension of the trunk and limbs, and pallor of the face. In suspicion there is rapid lateral oscillation of the eyes. In dissent there is lateral nodding of the head; in assent, anteroposterior nodding of the head.

It has been pointed out by Darwin and others that all these apparently purposeless actions are the survivals of actions which previously have been of service to the organism of ancestors. For example, in anger the gaze would be fixed upon a dangerous enemy, the fists clenched and the teeth ground upon some portion of his flesh; the dilatation of the nostrils would then become a necessity for breathing. The disdainful contraction of the levator labii superioris alæque nasi is the uncovering of the canine tooth preparatory to biting the object of disdain. The oscillation of eyes in suspicion is the search for anticipated danger. The lateral nodding of the head in dissent is the survival of the movement with which the infant refuses the proffered breast; while the nodding of assent is the movement of

acceptance of the breast. Fear, at least so far as its physical signs are concerned, is exhausted anger.

We have seen that emotional feelings consist of the complex of sensations arising from these various activities. According to this view it is not the emotion which gives rise to the expression, but the expression which gives rise to the emotion. The question of the truth of this assertion has been appropriately referred by Professor James to numerous actors: they have been asked whether they experience the emotions which they portray upon the stage. The best actors appear to be unanimous in the verdict that they actually feel the emotion they portray, when they are acting an emotional part well. The experiences of the audience are no less interesting than those of the actor. When a member of the audience feels that he is being too much overcome by the sadness of the situation on the stage, he extends the trunk, assumes a smile, takes a deep breath and surreptitiously wipes away the starting tear; by this means he dispels the emotion. And how often is an ill-timed merriment suppressed by assuming the expression, say, of attention. It requires, however, considerable effort to subdue a strong emotion; for emotions have a tendency to persist for a considerable time after the ideas which aroused them have disappeared from consciousness (inertia of emotion).

The conclusion is, therefore, that an emotion is a feeling compounded of sensations which arise in consequence of complex movements, reflexly aroused by the situation (real or imaginary) in which the individual is placed.

Each emotion has its corresponding **passion** and **mood,** a passion being an intense emotion of short duration, and a mood a prolonged emotion of moderate intensity. Fury, anguish, terror and hilarity are the passions corresponding respectively to anger, sorrow, fear and joy; the corresponding moods are respectively chagrin, gloom, anxiety and happiness.

Closely allied to the moods are the **temperaments.** For practical purposes, a temperament is to be regarded as a mood which lasts the greater part of a man's life. It is a man's temperament which is mainly responsible for the nature of the emotional tone aroused in him by any particular incident. The same incident will arouse different emotions in different individuals; this is dependent upon their difference of temperament. A similar incident will also induce different emotions in the same

individual at different times, according to his already existing mood or emotion.

Four temperaments are recognized : the sanguine, the choleric, the phlegmatic and the melancholic. The sanguine and the choleric are the temperaments characterized by rapidity of thought and ease of receptivity ; the phlegmatic and melancholic are characterized by slowness of thought and receptivity. The choleric and the melancholic are characterized by greater depth of feeling than the sanguine and the phlegmatic.

Temperaments.

	Shallow Feeling.	*Deep Feeling.*
Slow thought and receptivity	Phlegmatic	Melancholic
Quick thought and receptivity	Sanguine	Choleric

The Physical Basis of Emotion.

There is evidence to show that the thalamic region plays an important rôle in the development of an emotion reflexly aroused. If a patient has a lesion of one optic thalamus, say the right, and you tell him a joke, he smiles on the right side of the face only ; the smile does not occur on the left side. That this paralysis is not due to a lesion of the cortex or pyramidal tract is shown by the fact that the two sides of the face act equally when he *assumes* a smile. If, on the other hand, the patient has a lesion of the right Rolandic area, he smiles equally on the two sides in response to a joke ; but an *assumed* smile occurs on the right side only, volitional action being paralysed on the left side.

The observation of movements of expression occurring in the limbs is a more difficult matter in paralysed patients ; the physician has to rely upon an opportunity of watching the hand when the patient yawns. In paralysis of the hand due to some unilateral cortical lesion, the patient is unable to open the affected hand voluntarily ; but if he yawns, the hand opens slightly. If, however, he has a lesion in the region of one optic thalamus, he can open the opposite hand voluntarily ; but it

does not always open involuntarily when he yawns. The conclusion to be drawn from these observations is that the tracts subserving the motor element of emotion cross to the opposite side of the cord.

Now the only bundle which crosses from the mesencephalon to the opposite side of the cord is the rubro-spinal bundle of Monakow, that bundle which, as Held and Probst, and subsequently Buzzard and Collier, have shown, arises on the ventral side of the red nucleus, decussates in Forel's crossway with the corresponding bundle of the opposite side and is traceable in the region of the lateral tracts as far as the sacral region of the spinal cord. It connects the opposite nucleus ruber with the ventral horn of the cord. I submit, therefore, that Monakow's bundle subserves the function of the motor element of emotion.

We have also to consider the cortical portion of the system of motor neurons subserving the function of emotion. For this function a system of fibres is required to connect the cortex with the nucleus ruber, and such a system has been described by M. and Mme. Dejerine. The fibres originate from all parts of the cortex, especially the parietal lobe. They skirt the thalamus just above the radiations of the internal geniculate body, enter into the formation of the tegmentum and spread into the red nucleus at its antero-supero-external part. These fibres are to be regarded as the upper segment of the emotional motor system. Their intimate anatomical relationship with the thalamus easily accounts for the fact that that structure has hitherto been regarded as the physical basis of movements of expression.

It is of considerable interest that the cortico-rubro-spinal motor system is at least the main representative of the pristine motor tract, the tract by which in the lower vertebrates all motor impulses are transmitted. It has been demonstrated by Munzner and Wiener, Boyce and Warrington, Edinger and others that the pyramidal system of fibres does not exist in birds or in any of the lower vertebrates. In these animals the motor tract consists of cortico-thalamic and thalamo-spinal neurons only, the spinal fibres occupying the same relative position as the direct and crossed pyramidal system of mammals. In this connection it will also be remembered that in man the pyramidal tract is not completely myelinized until about the fifteenth month. Professor James has indicated the close relationship subsisting between emotions and instincts. They are both involuntary

motor responses to percepts and ideas, and the only difference between them is that instincts bring the organism into more practical relation with the object of the percept or idea. Now the lives of birds and lower vertebrates and the life of the human infant until it is about fifteen months old are practically little more than a mass of instinctive and emotional reactions ; and it is not surprising to find that such reactions are, among the higher vertebrates, still dependent upon the functioning of the pristine nervous system.

The neural process which takes place when an emotion occurs is then as follows :

Starting from the stage at which a sensation is registered in one of the projection areas or a percept or idea formed in one of the association areas of the cortex, an impulse is transmitted to the red nucleus by way of the cortico-rubral fibres, thence to the large motor cells of the lowest level by way of Monakow's rubro-spinal (and presumably rubro-bulbar) fibres of the pristine motor system, and thence to the muscles of expression. Contraction of these muscles upon their spindles effects the transmission of muscle-sensations to the cortex by way of the ordinary sensory paths, and it is the particular combination of these sensations among themselves and with vasomotor sensations, which determines the particular affective or emotional tone. A few of the more primitive emotions however are aroused by spinal, not cerebral, reflexes. Goltz observed signs of hunger in dogs from which he had removed the cerebral hemispheres, and Sherrington, quoting Sternberg and Latzko, observes that the crying of the young infant has been noticed in 'hemicephalic' (? anencephalic) children to be strong and of the usual character.

CHAPTER VI.

ACTION.

IN this chapter we have to consider the psychical concomitants of movement of the organism. There are four forms of action, viz., reflex, instinctive, volitional, and automatic.

REFLEX.

Reflex actions are all carried out by the lowest level of the nervous system, the level in which, to use the language of Dr. Hughlings Jackson, muscles are first represented, and which extends from the oculo-motor nucleus to the tip of the spinal cord. Reflexes have no psychical concomitants; but, as we shall see later, they frequently serve the purpose of arousing consciousness by drawing our attention to a stimulus which might otherwise pass unnoticed. Reflexes are developed in accordance with the natural laws of evolution, which result in the survival of the fittest. If ever there existed a race of men without plantar reflexes, that race has long since died out from septicæmia, pyæmia and other results of treading on sharp stones, etc. If ever there existed a race of men whose pupils did not react to light, that race has been killed off long ago by its enemies, whose pupillary reaction saved them from being blinded by the glare of the sun during combat. Dr. Sherrington, by his recent experiments on decerebrate cats and dogs, has taught us that many actions of great complexity, which hitherto have been considered to be of cerebral origin, are in reality of a reflex nature. For example, stimulation of one pinna of a spinal cat induces movements of the head and of all four limbs; while stimulation of one paw induces reflex movements of all four limbs and, in the case of a forepaw, of the head also. We have already referred to the probability that such a complex action as the crying of a new-born infant may be a spinal reflex.

INSTINCTIVE.

Instinctive action differs from reflex action in that it has psychical concomitants. 'Instinct is usually defined as the faculty of acting in such a way as to produce certain ends, without foresight of the ends, and without previous education in the performance.'* A few instances will make this definition clear.

Butterflies and moths invariably lay their eggs on or near the leaves of the plant which is the natural food of their young. Now these insects never knew their parents and they will never know their children; the butterfly therefore has no means of knowing what she is depositing when she lays her eggs near the food-plant of her caterpillar. Why does she do so? It is simply instinct; she cannot help it, and the performance is known as an instinctive act.

The first-year bird that has a fertilized egg in her oviduct starts collecting roots, moss, hair and feathers, and builds herself a nest; yet she can have no idea that she is going to lay eggs therein; she has had no previous experience of such a performance. Further, when the bird has laid her eggs, there seems to be no possibility that she can have the remotest idea of their nature; yet she sits, and sits, and sits upon them until they are hatched. Why does the bird go through all this performance? Simply because she cannot help it; it is the inborn way of the bird; it is instinct. If ever a bird existed that made no provision for its young, its race has died out in accordance with the laws of evolution.

These are but a few examples, but it may be stated generally that some of the lower mammals, all birds, all vertebrates, and perhaps all animals lower in the scale than birds, lead a purely instinctive life. Voluntary action, presently to be described, is peculiar to mammals.

This fact is of the greatest interest when it is correlated with the anatomical differences, already mentioned in the chapter on the emotions, between the motor nervous system of mammals and that of birds and lower vertebrates. Mammals alone have a pyramidal tract, subserving volition. We shall see later that instinct is essentially the same thing as emotion; its physical basis is therefore the same as that of emotion, viz., the cortico-rubral system of neurons, which is the mammalian representative of the pristine motor system of the bird.

* James, 'Principles of Psychology,' vol. ii., p. 383.

Although mammals are endowed with a volitional motor system as well as an instinctive, they are quite as full of instincts as the lower vertebrates. Why does a cat run after a mouse? Not because it is hungry and requires a meal, for it will run after the mouse whether it is hungry or not. It is for the same reason that many dogs will run after a bird; the likelihood of the bird forming a meal for the dog is exceedingly small. It is simply that these animals cannot help it; it is the instinct of pursuit. Why does the mouse run away from the cat? Not because it has any idea of death. Why does the Polar bear deliberately expose herself to the danger in which she sees her young? Why does any animal seek its mate? Why do many animals crowd together in flocks or herds? Simply because they cannot help it; it is their instinct.

Instincts, like reflexes, have developed according to the laws of evolution. If ever there existed a species of swallow which did not migrate for the winter months, it has long since died out from the effects of cold; and if ever there existed a genus of bird which did not make provision for its young and sit on its eggs, that genus has in consequence ceased to exist. Instincts are developed for the benefit of the race. Occasionally, however, we come across an uncorrected instinct, as in the case of the lemming, which periodically attempts to migrate in its thousands from its native valleys in Norway to the long-submerged continent of Atlantis: the result is that thousands of these animals are drowned in the sea. These animals must soon become extinct.

Man has been said to possess more instincts than any other animal.

As early as the third week of life, resentment is sometimes observed.

By the sixth week, eye movements are practically complete, and a child will instinctively converge for near objects. Passive attention develops, so that he will turn his head in the direction of a sound and reach out towards an object. Tactual space-perception, however, is yet incomplete, for at this age he will perhaps reach for the moon.

The seventh week is characterized by the development of the smile.

In the ninth week the instinct to handle objects is first observed, and by the eleventh week movements, which have hitherto been quite aimless, begin to assume a more purposeful aspect.

The instinct to imitate sounds also makes its appearance about this time. Surprise and fear now begin to develop, especially fear of change. This fear of change increases during the fourth month, until in the fifth, we find it crystallized into an instinctive shrinking from strangers.

Laughter shows itself at the end of the fourth month. During the fifth month the child develops the instinct to sit up and, about the end of that month, the instinct to carry objects to the mouth.

The idea of distance that a chick has as soon as it leaves the shell does not appear in the human infant until the sixth month of life. The instinct to grasp objects appears in this month, but the child seems to have no idea of letting objects go until two months later.

In the eighth month the child begins to take pleasure in making a noise, an interesting instinct which appears to be preserved through life. It will throw things on the floor for the pleasure of thus making a noise.

The instinct of locomotion is usually first observed during the tenth month ; this is followed in the eleventh month by the instinct to stand, the child constantly trying to get upon its feet ; and during the twelfth month this develops into the walking instinct.

During the ninth month the instinctive basis of language appears for the first time, and such sounds as ' kak-kak ', ' ba-ba ', and ' da-da ' are uttered. These repetitive sounds have probably little or no meaning until about the fifteenth month, when ' dada ' and ' bow-wow ' are uttered in association with the respective percepts of a man and a dog. The appellation ' dada ' is not limited to the child's father until the twenty-first month. But all these sounds are at first instinctive.

Perhaps the sound ' kak-kak ' or ' ack-ack ' is the most striking example of instinctive language. It occurs in almost every child belonging to the Aryan race and is an expression of disgust. The Hindoo word ' khaki ' means brown, the colour of dirt, dust or fæces. I have frequently heard the same sound uttered by monkeys in the Zoo, when annoyed in any way by another monkey. Now the monkey has no voluntary language, this sound is therefore of instinctive origin.

The sixteenth month is of great interest on account of the very earliest beginning of voluntary language. The child will

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say ' ey ' (an attempted ' yes ') for assent ; but the word ' no ' is not used as a verbal negation until some months later.

Language is first learned by instinctive imitation. During this month the child learns to say ' ta ' when it is given anything ; but it does so instinctively, for volition has not yet developed ; myelinization of the pyramidal tract is only just completed. If the child is told to say ' ta ' or ' ta-ta,' it does not respond, for the simple reason that to say a word to order is a volitional act. A similar condition is frequently observed in patients with motor aphasia, who will answer ' no ' to a question, but who cannot say ' no ' when told to do so.

Instincts still continue to develop. Curiosity makes its appearance about this time, in the eighteenth month.

In the nineteenth month the child shows signs of acquisitiveness by clamouring for its brother's or sister's toys.

In the twentieth month he shows a desire for social intercourse, the beginning of the instinct of sociability.

About the twenty-first month the instinct of cleanliness appears, not active cleanliness, but the avoidance of filth ; and about the end of the second year, the child ceases to be ' wet and dirty '.

The instinct of make-believe and play develops at the beginning of the third year.

During the third year the child gets some idea of time and has a definite concept of past and future. Accordingly memory, on the one hand, and anticipation on the other, begin to appear. The instinct of rebellion also makes its appearance.

Destructiveness is an instinct which appears in the fifth year. The child often exhibits this by pulling off the legs and wings of flies ; disinterested cruelty is a primitive instinct. From this year onward the boy loves to tease others, and he fights others with intent to do bodily harm. Here are the beginnings of the instinct to kill, not only the lower animals for food, but even human rivals.

Constructiveness develops a couple of years later. If a six-year-old pulls his father's watch to pieces, it is partly for the purpose of giving himself the subsequent pleasure of putting it together again.

Emulation and rivalry appear about this time. Children of this age will, for example, vie with one another in collecting the largest bouquet of wild-flowers for their mother.

The instinct to make collections of some kind usually shows itself, at least in boys, about the ninth or tenth year.

The instinct to eat, which develops at a very early age, becomes especially prominent about this time. At this age the boy eats everything that is placed before him; there seems to be no possibility of satisfying his appetite and he takes the greatest interest in the 'tuck-shop'. I do not mean the sweet-shop, but the 'tuck-shop' where they sell such things as dough-nuts.

The period between twelve and fifteen is characterized by well-marked boastfulness and conceit. This usually develops into a feeling of power, general *bien-être* and, if it is not soon under volitional control, a state of simple mania.

Modesty is a remarkable instinct which develops at puberty and is peculiar to the human species. The sexual instinct appears shortly afterwards. Then follow the instincts of hunting, fishing and shooting, stronger in man than in woman, for it is the man's natural duty to provide food for his family. In civilized communities these last instincts usually find an outlet in open-air games. The study of general paralysis has led me to think that the spending of money is also instinctive at first.

Parental love and jealousy are instincts which develop later.

This by no means exhausts the list of instincts. There are many others, the date of whose first appearance I have been unable to fix, such as secretiveness which causes people, even in the wilds of the country, to pull down their blinds at sunset.

The reader has already said to himself: 'Love! Jealousy! Modesty! These are emotions; these are not instincts'. The objection holds good to a certain extent. Instinct may be regarded as the expression of an emotion which occurs in response to a group of sensations, be they the sensations which a bird experiences when there is an egg in its cloaca, the visual sensations of a cat when she sees a mouse or the visual sensations of a lover who sees his sweetheart walking with another man. The resulting movements are the expression of the accompanying emotion. The only difference is that emotional movements are more restrained than instinctive movements; instinctive action goes far enough to bring the organism into some special relationship with the outside world.

From disuse or constant inhibition many of the above instincts may atrophy. Similarly if the normal stimulus to an instinct

does not occur at the time when that instinct usually develops, the probabilities are that it will never appear. For example, a town-bred boy seldom acquires in after life the instincts of hunting, fishing and shooting.

Instinctive action on the occasion of its first occurrence is blind; but after a given instinctive act has occurred several times and its purpose has become clear, it can no longer be considered blind. We must therefore regard instinct as being implanted in us for the purpose of giving a series of cues to volition.

Some authors have described **impulse** as a separate form of action. It is defined as action occurring without deliberation, immediately upon the presentation of a percept or idea. On examination, however, of impulsive acts, it will be found that they can always be referred to some instinct.

Voluntary.

Voluntary action is action which occurs after deliberation. In this case the individual has to choose between one action and another or between action and inaction. As long as indecision lasts there is a conflict of motives, which we call deliberation; and as long as deliberation lasts inaction is the result.

The final decision to act is arrived at in one of two ways. In the first, all the conflicting motives have been considered, a conclusion arrived at as to what is the best thing to do and we do it. In the second, deliberation is cut short and decision is forced upon us before we have considered all the evidence. 'The house is on fire! For God's sake, do something! It matters not whether you fetch a bucket of water or run to the fire-station or get the people out of the house; but act at once without further deliberation.' Again: 'Which boot shall be put on first? It matters not; deliberate no longer, but act at once or the day will be gone.' This latter form of action is probably the more common of the two.

Movement itself unless inhibited is the inevitable sequel to the idea of movement; this is shown by introspection. If the reader will form a vivid idea of some movement (for example, getting up to open the door) he will find that the muscles necessary to the movement at once begin to contract; and he will actually cross the room unless the action is inhibited by the thought that he is only performing an experiment.

I understand that among the enthusiastic crowds which nowadays attend football matches it is quite a frequent occurrence for some member of the crowd to receive a violent kick from an onlooker behind him when one of the players is kicking the ball. Such an onlooker forms a vivid idea of kicking the ball himself and the idea sets free the movement.

We see then that volitional action is the result of ideation and we must conclude that the physical basis of volitional action is in the ideational centres, that is to say, in the cortex cerebri. From the study of prefrontal tumours it has been found that the ideomotor centres, where movement-ideas arise, are situated in the left prefrontal lobe. The left prefrontal lobe is therefore to be regarded as the physical basis of volition. In the above instance the idea of kicking is formed firstly in the visual perceptual areas, the angular gyri, and secondly in the motor ideational area in the left prefrontal lobe.

The diagram of the cerebral centres of movement on p. 28 is adapted from Grünbaum and Sherrington's work on the brain of the chimpanzee and from other diagrams.

The dawn of volition, including voluntary language, occurs about the age of seventeen months. Volition continues to develop at least up to thirty years of age and perhaps much longer.

I have said that the function of instinct is to give the cue to volition. In other words, the pyramidal system tends to take over some of the work of the cortico-rubral system. In this way volition acquires control of instinct; and the essential feature of a man with a strong and stable personality and a fine character is that he has complete control of his instincts.

Inaction arises from one of five causes: (*a*) A generally inattentive condition of consciousness (day-dreaming); (*b*) absence from the ideas in consciousness of anything to suggest the idea of movement; (*c*) equal strength of the motives for several actions, deliberation being still in progress; (*d*) inhibition of action by some strong emotion, such as fear and (*e*) the conclusion that inaction is more advantageous than action.

AUTOMATIC.

Automatic action is action which at one time in the history of the individual has been volitional but owing to the frequency with which the particular act has been performed is now

carried out without psychical concomitants. Walking, winding one's watch, turning out the light when one goes to bed and turning over the pages of a book are typical automatic actions.

The favourite example is a practised pianist who can play a piece of music while he holds a conversation on some topic quite unconnected with the music and meanwhile pays no heed to the movements of his fingers. Such phenomena as these illustrate the ease with which the nervous system forms a 'habit'. It has been said that 'Habit makes easy'. Not only is this the case, but it is also true that it is extremely difficult to free oneself from a habit, at least after thirty years of age.

There are two differences between a voluntary and an automatic act. One is that a voluntary act necessitates attention to its performance while the performance of an automatic act does not arouse the attention. The other is that a movement-idea precedes a voluntary act, but not an automatic act; from which we may conclude that the ideomotor cortex of the left prefrontal lobe has nothing to do with automatic action.

Now in advanced cases of senile dementia, voluntary and automatic actions are in abeyance, although there is no true paralysis indicative of damage to or atrophy of the Rolandic areas of the cortex. In such cases there is atrophy of both frontal lobes, but no affection of the precentral gyri. It seems therefore reasonable to conclude that, while the physical basis of volitional action is in the left frontal lobe, that of automatic action or habit is mostly in the right.

Why is it that attention is not aroused by the performance of an automatic act; except, sometimes subsequently, when one finds that one has acted inappropriately, *e.g.*, wound up one's watch when changing into evening dress?

In the study of automatic action we are brought face to face with the fact that *some* cortical cerebration takes place without awakening consciousness. Now it is well known that synaptic resistance is permanently lowered whenever that resistance is overcome, and therefore that frequent overcoming of that resistance must finally reduce it almost to nil, thus creating a tendency for the particular interneuronal connections to occur again. But how are we to explain the fact that the consciousness of frequently repeated actions gradually sinks into the background?

There need be no difficulty in answering this question. The

phenomenon is self-explanatory; it demonstrates the fact that consciousness is mainly aroused by the formation of unusual interneuronal associations.

No misconception need arise from this popular but somewhat erroneous use of the word 'consciousness.' When a person says, 'I did it unconsciously', he does not mean that he was unconscious at the time that he did it; he means that he did it without paying any attention to the action. The conclusion, therefore, at which we have arrived is that 'attention' is aroused by the formation of unusual interneuronal associations, by the overcoming of synaptic resistance where that resistance is still high, while *some* cortical cerebration may occur independently of any activity of the 'attention'. When we say that the attention is aroused by the formation of unusual interneuronal associations, we are only stating in another form a truth which will be repeated in the chapter on Attention, viz., that the suddenness of a stimulus is a character which causes it to engage our attention, and suddenness is nothing more or less than 'non-associatedness'. Inasmuch as attention plays an important part in determining the remembrance of any particular idea, automatic acts are with difficulty remembered.

The Reaction Experiment.

Action has been reduced to its laboratory form in the so-called reaction experiments. The essential piece of apparatus for the estimation of reaction-time is a chronoscope of some kind. This is an arrangement by which time can be measured to a thousandth of a second and is so adjusted in connection with other apparatus that the time may be measured between the giving of a stimulus to sensation and the motor reaction of a subject in response to the stimulus, which reaction consists of his pressing a button (electric or otherwise) which also is in connection with the chronoscope. An ordinary physiological drum with a tuning-fork might serve the purpose, but the noise of the tuning-fork is rather distracting to the subject.

The apparatus is used in many ways. In the *natural* reaction a stimulus is given to vision, touch, hearing, smell or taste, and the subject presses the button as soon as he experiences the sensation. The *sensorial* reaction is similar; but in this case the subject is required to pay special

attention to the character of the stimulus and resulting sensation. In the *muscular* reaction special attention is given to the movement. The experiment may be modified in many ways; for example, the subject may or may not be warned by the experimenter that he is going to give a stimulus; a couple of seconds before the stimulus is given the experimenter may say 'Ready' or 'Now'. These modifications of the attention make considerable difference in the reaction times. Here are some figures:

	Touch.	*Vision.*	*Hearing.*
	Second.	Second.	Second.
Natural	0·12–0·18	0·19–0·22	0·14–0·19
,, (without warning) ..	0·25	—	—
Sensorial	0·21	0·27	0·23
Muscular	0·11	0·18	0·12

The variation in these results has more bearing upon the phenomena of attention than upon those of action. All that we learn from them is that a movement is released more rapidly if attention be directed to it. Variations in the natural reaction-time depend upon differences in the ideational type of different individuals; some types are more motor, visual or auditory than others.

The reaction experiment can be varied *ad infinitum*. For example, it may be used to demonstrate that it takes longer to react with the foot than with the hand and longer still to react with the whole body as in making the start for a race. It has been shown that the reaction-time of long-distance runners is longer than that of sprinters.

Now all these data may be very interesting but they teach us little about the psychology of action if the reaction experiment is regarded as an end in itself. If, however, it be used as a means of introspecting action in its laboratory form, it is found to confirm the conclusions at which we have already arrived by cruder methods of investigation. When a reaction experiment is performed, the subject should give the results of an introspection during the proceeding. If he be a practised observer, his introspection will be something like this:

Muscular Reaction.—'I had a strain sensation extending from the elbow to the finger. I had a vivid idea of the movement which I was about to perform and to which my attention was directed. I scarcely noticed the stimulus, but felt that it was a relief to move.'

Sensorial Reaction.—'My attention was wholly directed to the stimulus; (perhaps) I was afraid that I should react to a false stimulus; I then had a visual idea of my own movement and of the apparatus.'

The former is, perhaps, impulsive action in laboratory form; the latter is 'action after deliberation' in its simplest form. This is, however, more characteristically represented in the laboratory by the 'discrimination reaction'. In this experiment the subject is required to react to one stimulus only although several may be given; for example, he may be required to react to the colour blue only although he may receive the stimuli of other colours. As a matter of fact, the experiment scarcely differs from the ordinary sensorial reaction experiment, because it is customary in the latter to give an occasional false stimulus.

In the 'choice' reaction experiment, the subject has to react differently to different stimuli; *e.g.*, he has to react with his right hand to blue and with his left to red (simple choice). Or he may have to react to ten different stimuli with each of his ten fingers respectively (compound choice). Choice-time is obtained by subtracting discrimination-time from the times obtained in these 'choice' experiments.

Cognition-time is obtained by subtracting discrimination-time from the time taken to cognize a given object, association-time by subtracting discrimination-time from the time required for the development of an associated idea. The association reaction is of course made with the mouth in naming the association; a special mouth-key is accordingly provided for this experiment.

The reaction-times obtained are of little value without corresponding introspections; but a few are here appended to give an idea of the duration of these mental processes:

	Second.
Cognition (colour)	0·03
,, (short word)	0·05
Choice (two movements)	0·08
,, (ten movements)	0·4
Association-time	0·3–0·8

CHAPTER VII.

ATTENTION.

WE are now in a position to understand the nature of attention.

Attention is that process by which the organism is placed in the attitude best adapted for the reception of stimuli arising from an object attended to or noticed; whereby the perception of such object becomes clearer and more distinct in consciousness.

The accuracy of this definition will be established as we proceed. The attitude of the organism during attention to an idea of an object resembles that during attention to a percept of the object.

THE LAWS OF ATTENTION.

1. The truth of the assertion that attention to a percept or idea renders such percept or idea *clearer* and *more distinct* is well illustrated by the 'puzzle pictures' of cheap periodicals. There is perhaps a representation of a landscape and a huntsman and we are told to 'Find his dog'. As soon as we find the dog it is so clear and distinct that we cannot look at the picture without seeing the dog and it becomes a matter of surprise that we did not see it before. At the same time, while we are looking at (directing our visual attention to) the dog, we observe that the rest of the picture falls into the background, is less distinct and less clear. This latter point is also noticeable in listening to an orchestra. If we single out any particular instrument and listen to it, *i.e.*, attend to it, it becomes clearer and more distinct, while the rest of the orchestra becomes less clear and less distinct. Moreover it is to be noted that there are only these two degrees of clearness and distinctness of sensations and percepts, clear and not clear, distinct and not distinct; there is no gradation. It is true that there are degrees of attention: an object may be attended to in such a degree that nothing else

is noticed for the time being (absorbed attention), as in the classical instance of Newton neglecting to dine when working out his system of fluxions, or it may be attended to only a little more than other processes in consciousness ; but in each case there are but two degrees of clearness and distinctness.

2. Under certain circumstances, it is also to be observed that a sensation becomes *more intense* during attention. This is only true, however, when the sensation is already of slight intensity. The pressure of our clothing passes unnoticed as a rule ; but when any particular part of the skin is made the object of attention, the sensation of pressure there may become so intense as to necessitate readjustment of the clothing over it. If a chord be struck on the piano and allowed to ring off and any of its constituent tones be singled out by attention, that tone at once becomes louder—in other words, more intense.

3. It has been demonstrated in the laboratory that a sensation of extremely brief duration becomes *longer* when attention is directed to it.

4. A sensation or percept enters consciousness *more quickly* when attention is directed to it. A hammerman sees the sparks fly before he sees his hammer strike the iron. If a bell-metronome be set in motion and attention be directed to the tick, the tick is heard before the bell ; but if attention be directed to the bell, the bell is heard before the tick.

5. The above experiment also serves to illustrate the phenomenon known as the *inertia of attention*. If, by an act of attention, the tick be heard before the bell, it continues persistently for some considerable time to be heard before the bell, in spite of efforts being made to hear the bell before the tick.

6. Another characteristic of attention is that it *fluctuates ;* and it can easily be demonstrated that this fluctuation has a regular periodicity. If a watch be placed in the corner of an otherwise silent room and listened to from the opposite corner, it is found that the ticking is alternately heard and not heard about every four seconds. The same phenomenon may be demonstrated in the domain of vision by means of a Masson's disc. A black spot is painted near the periphery of a white disc ; when this disc is quickly rotated on a colour-top, the black spot appears as a very faint grey ring on a white ground. If the grey ring be fixated continuously it is found to be alternately seen and not seen about every four seconds. Minimal pressure stimuli

behave in the same way. Lehmann has shown that this pulse of attention appears to be dependent upon the respiration.

7. Experiments have been made with the object of determining the number of things to which we can attend at the same time. In most of these experiments a number of letters or figures are exposed to the gaze for a very short time, say one-tenth of a second, and the observer is then required to name the letters that he saw. As a rule the number does not exceed five or six. That this does not depend on any normal deficiency in the visual apparatus is shown by the fact that at least twice this number of letters can enter consciousness if they be arranged into words. Under these circumstances several letters combine to form one idea.

The Varieties of Attention.

Voluntary Attention.

By introspection we find that there are many sensations and percepts to which we are unable to attend without a certain amount of voluntary effort. Attention to sensations of minimal intensity, to a lecturer with a bad delivery or to a book on a difficult and unfamiliar subject, is accompanied by a distinct sense of voluntary effort.

Now if we endeavour by introspection to discover the constitution of this sense of effort we find that it is made up of numerous sensations of muscular strain. The muscles of the eyes and upper part of the face come into play in attention to visual percepts or ideas; the head is turned in attention to auditory percepts or ideas; there is movement about the lips in attention to gustatory sensations; and accompanying these movements there is in voluntary attention a sensation of muscular strain. If we endeavour by introspection to discover anything more than these sensations in the feeling of effort, we fail. The conclusion is therefore that this sense of effort (so-called conation) consists of nothing more than a number of sensations of muscular strain. Further examination of this muscular contraction reveals that its purpose is to place the organism in the attitude best adapted for the reception of stimuli from the object attended to.

Since these muscular contractions are volitional, we may con-

clude that they originate in the frontal lobes and that the motor impulses are conveyed by way of the pyramidal tract. Mosso has shown that during an act of attention the respiration becomes slower, deeper and more diaphragmatic.

Instinctive Attention.

In contradistinction to sensations and percepts attention to which is impossible without effort, there are others which immediately claim our attention. Attention is thus involuntarily (instinctively) brought into play by (1) stimuli of great intensity and by (2) stimuli affecting a large area of skin or retina. (3) Suddenness of stimulus claims involuntary attention, possibly on account of the nervous system having been at rest from previous excitation. In this case the stimulus overcomes a large amount of synaptic resistance. (4) Movement of the stimulus excites the attention, probably for a similar reason, fatigue of the sensory tracts being reduced to a minimum. (5) Association and (6) contrast of the stimulus with the existing contents of consciousness also favour the development of involuntary attention.

Lastly there is the question of ' interest '. Interest in a given object depends upon the mental constitution of the individual. This in turn depends upon hereditary and acquired mental characteristics. Acquired mental characteristics are the result of education, not merely the education received at home, at school and at college, but the education derived from the individual's conversation with his associates and from his own observation of his environment. Hence one individual will have an interest in postage-stamps, another in butterflies, a third in the government of his country, a fourth in geology and so forth. Any of these individuals will, in one minute's glance at his morning's paper, discover whether there is any information concerning his particular hobby. The word ' butterfly ' at once catches the eye of number two, while the word ' trias ' attracts number four.

Hereditary mental characteristics are developed as a natural result of the struggle for existence in past ages; and these hereditary characteristics determine what must of necessity be of interest to the organism and what must of necessity engage its attention. A sound may be the roar of a beast of prey; an

object moving across the field of vision is a possible meal; and the organism that takes no interest in and gives no heed to such stimuli as these pays for its inattention with its life. Thus we find that attention, like affection, is the inevitable result of the normal processes of evolution.

In each of the above instances, a moment's consideration reveals that the act of attention to a particular percept consists of a movement, placing the organism in an easy attitude for the reception of sensations constituting the percept.

From the above considerations we may conclude that attention of this nature is instinctive in origin and that it must therefore be referred to the cortico-rubral system of neurons.

Reflex Attention.

It has just been said that suddenness of a stimulus causes that stimulus to claim involuntary attention. It is, however, extremely probable in many instances that attention thus aroused is reflex in character and therefore referable to the lowest level of the nervous system. When, as I am engaged in writing these pages, the whistle in my room is suddenly blown, I experience a 'start', consisting of a momentary contraction of the muscles of my back, shoulders and neck. The muscular sensations arising from this start and the sound of the whistle arouse consciousness at the same time; I do not first hear the whistle and then start; the muscular contraction is therefore a reflex action referable to my lower motor neurons.

We have to recognize that there is a certain amount of interchange between these three varieties of attention. In immediate succession to the reflex 'start', there is a certain amount of instinctive attention to the whistle; then follows an act of voluntary attention consisting of rising and listening to the message transmitted up the speaking-tube. In listening to a lecturer with a bad delivery, the sense of voluntary effort disappears from time to time when the subject becomes interesting; and indeed we find during any lecture that attention becomes alternately voluntary and instinctive, and passes through stages in which the two varieties are blended.

Whether there is also an *automatic* form of attention I am not prepared definitely to state; but I am inclined to the belief that

constant efforts of voluntary attention create a ' habit of attention ' and render the action easier of performance.

In considering the reaction experiment, we found that attention to the movement shortened the reaction-time. As was stated on p. 7, this is a simple example of facilitation. It illustrates the utility of muscular contraction as the essential feature of attention ; it is the placing of the motor mechanism in readiness to act in response to a stimulus.

To sum up : Attention is a motor reaction placing the organism in an attitude whereby a percept attended to rises rapidly, clearly and intensively into consciousness, and whereby the organism is placed in a state of alertness which may be of vital importance to the individual.

CHAPTER VIII.

FATIGUE AND SLEEP.

FATIGUE may be defined as a diminution of muscular and intellectual power, arising from prolonged activity of any kind and accompanied by a sense of weariness. After action, fatigue. Fatigue occurs more readily in the old than in the young, more easily in women than in men and more rapidly in some people than in others of the same age and sex. We are more readily fatigued by unusual work than by work to which we are accustomed and live more readily when in poor health than when in robust health.

Different people become fatigued in different ways. With some there is at first an increased capacity for work, this being followed by gradually diminishing capacity ; with others, there is no initial increase, but the capacity for work diminishes from the first ; with a third class, the capacity for work remains at a high level for some considerable time, then fatigue sets in almost suddenly ; with yet another class, the capacity for work diminishes rapidly at first, remains at a moderate level for some considerable time and finally is reduced to nil. These features are capable of being reproduced graphically in ergographic tracings made by these several people and presently to be described.

Muscular fatigue is characterized by a certain amount of pain in the tired muscles ; fatigue in general is characterized by quickened pulse and respiration, dilatation of the cutaneous arterioles, with perspiration and a consequent fall in the body temperature. With some people, perhaps with all, this fall of body temperature is preceded by a rise. Yawning is a fairly constant feature, as is also a sense of lightness, heaviness or weariness of the legs. The power of attention is diminished, ideas tend to become confused and there is weakness of memory.

There is loss of control of the musculature for fine movements, a feature which shows itself in the handwriting.

Some people when they are tired are subject to palpitation, indigestion, dizziness, vertigo, irritability, a sense of heaviness or of lightness of the head, tingling and other sensations in various parts of the body and hallucinations of vision or even of hearing. Most of these latter symptoms are to be regarded as characteristic of exhaustion rather than fatigue and should be taken as a warning note that the person requires a holiday.

Muscular Fatigue.—If a muscle-nerve preparation be made with the gastrocnemius of a frog and a graphic record be taken of some 250 contractions induced, at intervals of a second and a half, by electrical stimulation of the nerve, we are enabled to study the effects of fatigue on the muscle. We find that contraction and relaxation of the muscle become progressively slower, that there is a progressive increase of power during the first ten or twelve contractions and that afterwards the muscle becomes progressively weaker until at last it cannot be induced to contract at all. According to Kronecker, the curve of decline in the contractions is a straight line (law of fatigue).

Left to itself, such an exhausted muscle will recover in the course of an hour or so ; but if the nozzle of a syringe be inserted into the artery of the muscle and the muscle be washed through with normal saline solution it will recover immediately. Further, if the washings be injected into a fresh muscle they will immediately induce fatigue of that muscle. We learn from this experiment that the phenomena of fatigue are due to products which act as a sort of poison to the muscle. Further, if the blood of a dog fatigued by excessive exercise be transfused into the vascular system of a fresh dog, the latter at once shows signs of fatigue.

The composition of the products of fatigue, so far as I am aware, has not yet been completely determined. All that we know is that the chief substances formed when a muscle contracts are lactic acid and carbon dioxide and Mosso has suggested that some leucomaines (alkaloids formed by living tissue) may also be produced. At present, however, there is no conclusive evidence that any of these substances is wholly responsible for the phenomena of fatigue ; but we are all familiar with the fact that a stuffy atmosphere is inimical to successful work and often induces sleep.

In man fatigue has been studied mostly by the aid of an instrument called the 'ergograph', devised in its original form by Professor Mosso of Turin. It consists of two parts: (1) an arm-rest with a pair of bits to hold the hand in position and (2) a pulley connected with an apparatus for registering movements made by one of the fingers to which is attached a string supporting, over the pulley, a weight of about 3 pounds. The ergograph is a contrivance for recording the *curve of fatigue* of different individuals under varying circumstances; this is usually called an 'ergographic tracing'.

In making a tracing the finger is flexed as much as possible every two seconds, this procedure being continued until the flexor muscle is completely fatigued and the finger quite useless. The contractions may be executed either voluntarily by the person under observation, or involuntarily by electrical stimulation of the motor nerve of the flexor muscle of his finger. When the involuntary method is used, the curve obeys the law of fatigue; it is a straight line. With the voluntary method the curve varies with different individuals according to the way in which they severally become fatigued (*vide supra*).

Maggiora has shown in the following way that the later contractions are much more exhausting than the earlier, although they do much less work. As a rule, two hours' rest is sufficient for all trace of fatigue to disappear from a muscle completely exhausted by, say, thirty contractions against the ergograph. Now if only fifteen contractions are executed, the muscle is completely rested in half an hour; the requisite amount of rest is reduced to a quarter when the number of contractions, although doing the greater portion of the work, is reduced by one half. Hence Maggiora deduces the 'law of exhaustion', which is that 'work done by a muscle already fatigued acts on that muscle in a more harmful manner than a heavier task performed under normal conditions'.

Contracture.—We have seen that, in the case of an involuntary ergographic tracing, there is a general increase of the amount of work done by the first few contractions. By some this is ascribed to the effect of practice, by others it is considered to be the very earliest sign of fatigue. In favour of this latter view is the fact that, in some excitable and nervous people who are easily susceptible to fatigue, the muscle under investigation does not completely relax between the contractions, with the

result that the summit of the curve remains high until fatigue is almost complete. And it is a matter of common observation that, when a hypermetropic eye becomes fatigued, the patient suffers, not from inability to accommodate, but from difficulty in relaxing accommodation, in other words, from spasm of the ciliary muscle. In the study of intellectual fatigue we shall meet with analogous phenomena.

Intellectual Fatigue.—If an ergographic tracing be taken after prolonged mental exertion, it is found that the capacity for muscular work is either increased or greatly diminished. On closer investigation it is found that tracings taken during the earlier stages of mental fatigue show an increase in the amount of work done, while those taken during the later stages show a diminution. Professor Mosso in his work on fatigue gives two ergographic tracings performed involuntarily by the finger of Dr. Maggiora before and after examining twelve students in hygiene for their degree in the University of Turin. The muscular contractions were induced every two seconds by electrical stimulation of the median nerve near the axilla. The effect of the examinations which lasted three hours and a half was to reduce the number of contractions from fifty-four to twelve, the initial contraction of the second tracing being less than three-quarters of the height of that of the first. Similar results are obtained by the voluntary method.

From these observations it might be inferred that all fatigue is muscular in origin, fatigue-products during mental exertion being formed as a result presumably of that muscular strain which is a constant concomitant of the act of attention. In other words there is no such thing as primary fatigue of the nervous system.

That this is not the case, however, and that the problem is not so simple as it appears at first sight is shown by certain experiments by Sherrington on the scratch-reflex of a spinal dog. There is a large area of skin covering the ribs of a spinal dog, mechanical or electrical stimulation of which produces a scratching movement of the hind-limb of the same side. Now this reflex can be fatigued in a few minutes by persistent stimulation of a given spot within the said receptive area. That this fatigue is of nervous and not of muscular origin is shown by the fact that the scratching will start afresh if the stimulation be transferred to another spot a few centimetres away, but within

the same receptive area. This shows further that, so far as the nervous system is concerned, the receptive synapse tends to become fatigued more readily than the efferent (motor) synapse. Sherrington also points out that nervous fatigue passes off much more rapidly than muscular fatigue, the scratch-reflex being as brisk as ever again after the lapse of a few minutes.

The following method of obtaining a direct curve of intellectual fatigue in man has been devised by Weygandt. The necessary apparatus consists of a clock which rings a bell once a minute (or other prearranged time), a sheet of numerical figures arranged in vertical and horizontal lines and a pencil. The clock is set going and the person under observation takes the pencil. When the bell rings he starts adding up the first column as quickly as he can. When the bell rings again he ceases adding up the first column, draws a line, writes down the result so far as he has gone and immediately starts on the second column. The same process is repeated and when the bell rings a third time, he passes on to the third column and so on. The experiment is complete when about twenty columns have been added. On examination of the resulting curve it is found that the added portions of the columns at first increase in length ; then, as the secondary effect of fatigue sets in, the length of the added portions gradually diminishes.

The study of fatigue is yet in its infancy, but we are justified in asserting that all its phenomena are due to the formation of paralysing products within the muscular, and perhaps the nervous, system ; and it need be no matter for surprise that the initial action of these products is stimulating in its nature, when we reflect that the same is true of many of the sedative drugs we possess, *e.g.*, chloroform, ether, morphia, cannabis indica and alcohol.

Sleep.

And after fatigue, rest ! Sleep is the condition of partial or complete unconsciousness which normally recurs once in twenty-four hours and occupies about one-third of that time.

Sleep abolishes fatigue ; in other words, it helps to rid the organism of fatigue products. In what way it does so, whether by destruction or excretion, is unknown.

Sleep varies in its soundness or depth. By awakening sleepers with the noise of brass balls falling from various heights on an

open board, it has been shown that sleep is deepest about an hour and a quarter after its onset and that its depth may be represented by a curve as follows :

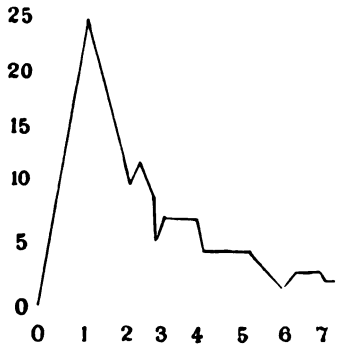

FIG. 20.—SLEEP CHART (AFTER E. W. SCRIPTURE).

Horizontal scale gives hours after falling asleep. Vertical scale gives energy of falling ball in thousandths of gramme-centimetres (weight of ball x height of fall). Although it cannot be said that the intensity of the sound was proportional to the energy of the falling ball, yet the scale can serve as a fair approximation to a scale of sound-intensities.

All the vital functions are reduced during sleep ; the pulse and respiration (which is mainly diaphragmatic) are slowed and the excretion of urine and of carbon dioxide is diminished. Heat-production is at its lowest ; we therefore require to be more warmly covered than during waking hours. The heat-production during sleep is roughly 40 kilo-calories per hour as against 100 during rest, 150 during moderate movement and 300 during exercise. The brain is partially anæmic during sleep as is evidenced by the depression over the anterior fontanelle of infants and over trephine holes in adults and by certain experimental observations on lower animals. The optic disc is pale, the retinal arteries small and veins large. The voluntary muscles are relaxed and the superficial and tendon reflexes absent. The muscular tone of the flexors of the fingers is perhaps increased ; that of the orbicularis palpebrarum is undoubtedly increased while the levator palpebræ superioris is relaxed. If the eyelids be raised it will be seen that the eyeballs are rotated upwards and that they have a constant slow lateral movement, the two globes moving independently of one another. The pupils are contracted.

The condition of the neurons during sleep is of great interest. It has been found that excessive activity causes disappearance, at least to a considerable extent, of the chromatoplasm from nerve-cells and that rest allows it to reaccumulate. It has also been demonstrated experimentally that the gemmules are protruded during sleep and retracted during activity (Lugaro). It is therefore to be assumed that, during the process of going to sleep, the gemmules are gradually being protruded. It is conceivable that during this stage a new interneuronic (synaptic) association occasionally occurs for the first time. Now in considering automatic action we saw reason for the belief that the occurrence of new or unusual synaptic connections between the neurons induced instinctive or reflex attention; and we have further seen that an ordinary 'start' is nothing but a special form of reflex attention. We thus see a possible explanation of the 'start' which, during the process of going to sleep, occurs so frequently during the first half of life. When once the neurons are all connected up attention is no longer possible and all slight sensations pass unnoticed.

There can be no psychology of deep sleep. When a person is unconscious, all mental operations are in abeyance: what more can be said? In very light sleep, however, when we are not quite fully awake, there is a marked tendency to the formation of hallucinations, especially visual. This condition is known as the hypnagogic state, and the hallucinations as hypnagogic hallucinations.

Dreams.—During sleep, but probably not during deep sleep, most people are subject to dreams. A few people never have a dream in their lives. Dream-perceptions are mostly visual; next in order of frequency come auditory perceptions. Visual dream-perceptions are usually coloured, but it is noteworthy that unsaturated colours and intermediate shades of colour are unusual in dreams. I believe it is also uncommon to dream the colour blue. Olfactory hallucinations are also extremely uncommon in dreams, and gustatory sensations practically never occur. If we dream we are at dinner, we see the various dishes but very rarely eat anything; and if we do, we find invariably that the dainty is entirely devoid of taste. When dream-smells occur it appears to be the rule for them to persist for a short time after waking.

Dream-movements also have their characteristics. Apart

from flying and floating sensations in which the body moves as a whole, it is to be observed that movements at the small peripheral joints are easy of performance, while movements at the large proximal joints are difficult. I do not refer to actual (somnambulistic) movements performed during sleep. We can waltz or spring and we can write or sew with ease; but if we attempt to strike or kick an adversary, we can get no force into the blow; it is like trying to kick him when we are immersed in water. It has been suggested by Dr. Hughlings Jackson that this is due to a larger representation in the frontal lobes of peripheral movements than of proximal movements.

Dreams are always of the immediate present and owing to inattention are incoherent; hence result their customary incongruity and absurdity. Hence too circumstances which would occasion surprise in our waking hours cause no surprise in dreams.

It would appear that it is possible for isolated portions of the brain to remain awake while the remainder sleeps. According to Professor James, a mother sleeping soundly by her sick child, in spite of the noise of traffic and of people talking in the room, awakens to full consciousness at the feeblest cry of her sleeping babe.

The act of going to sleep is normally an auto-suggestion. We place ourselves in a comfortable position, adjust our eyes etc. to the attitude of sleep, think of going to sleep and in a few minutes sleep results. If a person retires to bed thinking that he will not sleep, the result is that he lies awake for hours. According to Professor Baldwin self-consciousness is inimical to sleep; the idea that *I* am going to sleep is not so soporific as the idea that someone else is going to sleep.

Hypnosis.—In the special form of sleep known as hypnosis the subject has a vivid idea that he is going to sleep under the operator's influence, and it is the duty of the operator to encourage this idea by means of 'passes', incantations, stroking the skin etc. If the subject has an idea that the operator cannot send him to sleep, the latter will undoubtedly fail. It is clear therefore that hypnosis is in reality an auto-suggestion just as ordinary sleep is.

There are roughly three stages or degrees of hypnosis which merge into one another. The first stage is that of 'flexibilitas

cerea ', in which the limbs are rigid but may easily be moulded into any attitude by the operator. In this stage there is anæsthesia of certain portions of the skin and the subject is extremely susceptible to suggestion. In the second stage, that of ' lethargy ', the whole body is flaccid and the subject appears to be entirely unconscious. The third stage is that of ' somnambulism ', in which the subject is again extremely susceptible to suggestion and there is exaltation of the senses with disturbance of memory. In this stage mere suggestion from the operator suffices to enable the subject to perform actions which are impossible to him during his waking state. The subject on awakening has no memory of these actions ; yet, on the other hand, suggestions given during hypnosis, of actions to be performed subsequently at a given time when the subject is awake, are satisfactorily carried out without his being able to give any reason for such actions.

Several sittings are requisite before a person can be satisfactorily hypnotized ; but when once hypnotism has been induced it is an easy matter to hypnotize him on subsequent occasions. For this reason an operator should always ' lock ' his cases by the suggestion that the subject cannot be hypnotized by anyone else. A hypnotized subject, if left to himself without any suggestion, falls into a natural sleep and then wakes up.

The phenomena of hypnosis, wonderful as they are, do not merit the shroud of mystery in which they have been enveloped. I believe that they could all be found at times in ordinary sleep. In both conditions the attention is purely instinctive and lacks the ' inertia ' of waking attention ; and there is much the same disturbance of memory in both. Somnambulism occurs in deep hypnosis, just as it occurs in deep sleep, about an hour after retiring to bed. And with regard to the suggestion business, we are all as susceptible to suggestion as we can well be during our waking moments ; the ordinary somnambulist is only more so. When told to retire from a dangerous position and to return to bed he does so immediately. Whether he would perform such tricks as are done by the victims of professional hypnotists, if they were suggested to him, I am unable to say ; probably he would.

CHAPTER IX.

THE SENTIMENTS.

THE sentiments are somewhat allied to the emotions. An emotion is a sensation-complex resulting from an involuntary reaction to a percept or idea; a sentiment is a sensation-complex which arises when judgment is passed as to the way in which a percept or idea affects the feelings. In the former case attention to the percept or idea is instinctive; in the latter it is voluntary.

There are three kinds of sentiment: the æsthetic, the moral and the intellectual. The æsthetic sentiment arises in association with the passing of a judgment upon a thing, sometimes upon an action; the moral when judgment is passed on an action; and the intellectual when judgment is passed on a judgment.

The æsthetic sentiments form the largest group. The judgments formed in association with these answer the question: Is this beautiful or ugly? They include the sentiments of beauty, ugliness, comedy and tragedy. A thorough investigation of the first two of these would comprise a study of all the laws relating to art. It would include a study of symmetry, asymmetry and curves; of the combination and contrasting of colours; of the movements of dancing; of the most pleasing combinations of tones in music, of the formation of melodies and other sequences (avoiding of consecutive fifths and octaves), of fugue, counterpoint, orchestration, etc.; but obviously all this would be outside the province of this manual.

The study of comedy and tragedy is rather more important. By comedy we mean a combination of the beautiful with the ludicrous; by tragedy we mean a combination of the beautiful with the sad. This meaning of comedy and tragedy differs from the popular notion of these sentiments. We read on

the evening placards of a 'tragic' murder in Whitechapel when the paper contains an account of some loathsome incident totally devoid of any of the beautiful touches of true tragedy. Possibly such an incident arouses in a morbid individual some sentiment analogous to that of true tragedy experienced by a man of finer feelings when he reads Shakespeare's 'Romeo and Juliet'. Similarly there are many who regard coarse and disgusting stories as comic when there is no trace in them of the beautiful touches of true comedy.

The essence of comedy is sudden incongruity. If you see a child wearing his father's hat there is something absurdly ludicrous in the picture; but if you expect to see him in it and have already formed some idea of how he would look, most of the comedy of the situation disappears. The first time you hear of the famous general who pounced out of his front door upon a lady visitor in response to what he believed to be a runaway knock the comedy of the situation is much more striking than when the story is repeated, although we still appreciate the incongruity. The reason why we feel bored by so-called 'chestnuts' is that their incongruity lacks the suddenness which is necessary to humour.

Laughter which may be regarded as the expression of the emotion corresponding to the sentiment 'comedy', is somewhat of a puzzle to psychologists. It appears to have been evolved from the smile which makes its appearance in the infant before the laugh; and the elementary form of both is supposed to be the reaction to tickling. Tickling, in turn, is regarded as playing at attack. Laughter is therefore to be regarded as expression intimately associated with play. It is not perfectly clear what is the teleological value of laughter, but the following has been suggested:

The essence of children's play is make-believe, pretending to do that which in after life they will be called upon to do in reality. In other words play is the instinctive exercising of muscles in preparation for the work of real life. And when in play a puppy flies at its mother's throat or a human infant beats its mother, smiling or laughter on the part of the mother will indicate to the offspring that it has not gone too far. A change in the mother's expression will then indicate danger and cause the offspring to cease striking her.

The moral sentiments include the social, the ethical and the

religious. The judgments formed in association with these sentiments answer the questions: 'Is this antisocial?' 'Is this good or bad for the individual or for the race?' 'Is this in accordance with the Divine Will?' The common characteristic of actions which are judged as moral is that they involve the foregoing of present pleasure for the purpose of enhanced benefit or diminished inconvenience in the future to the individual or the race. Immorality arises from deficient voluntary control of the baser instincts.

The judgments formed in connection with **the intellectual sentiments** answer the question: 'Is this proposition true or false?' 'Am I to believe it or not?'

Belief.—Every judgment implies the possibility of an alternative: the judgment 'This is so' implies the possibility of the judgment 'This is not so' and it is left to the individual to accept one or the other of these judgments. Belief in the latter implies disbelief in the former. Belief and disbelief are therefore the same mental process. Their common antagonist is doubt which is an oscillation between belief and disbelief and gives its characteristic emotional tone in sensations derived from muscular tension and restlessness. The emotional tone of belief is that of relief, dependent upon relaxation of the muscular tension associated with doubt.

Under ordinary circumstances a judgment is believed when it does not contradict any other judgment which we have formed; it then arouses the emotion of conviction, which *is* belief. The final court of appeal is that of the organs of special sense. If we can see a thing we perceive it as a reality and believe it. Yet who is to say what is real and what is imaginary in view of the cases of double consciousness or of that of a man suffering from hallucinations of vision? These latter are so real to him that he throws his boots at the objects he sees. And what becomes of reality when the sleeper dreams 'This is no dream; this is reality'?

There are three forms of belief, which may be termed respectively (1) rational belief, (2) instinctive belief and (3) belief by suggestion. In the first form, *rational belief*, the individual examines the evidence for and against a given judgment, wherever possible referring each piece of evidence, as it arises, to his organs of special sense. When, by such a process of reasoning, a person arrives at a conclusion, his belief may be termed 'rational'.

It is quite possible for a person to have a rational belief in an erroneous judgment, some fallacies having crept into his train of reasoning; but this does not affect the psychical nature of his belief. That eminent neurologist, Dr. Charlton Bastian, believes that the spontaneous generation of living organisms is going on at the present day. Most, if not all, other scientific men believe Dr. Bastian's judgment to be erroneous in this matter; but he has arrived at his conclusions by processes of experiment and reasoning. His belief in them is therefore rational.

In other cases a person believes in a given judgment without going through any such process as the above. He or, more commonly, she *feels* that such and such is the case and, merely on account of the *feeling*, believes it to be so. One of the most common examples of this form of belief occurs when 'the wish is father to the thought'. A woman, with a distant relation whom she loves, may suddenly become persuaded that evil has befallen her dear one; and she believes it. Such beliefs as these have their basis in some emotional tone of feeling and therefore their physical basis is in the corticorubral system. For this reason, they may be called 'instinctive beliefs'. They are by no means always erroneous; but they are of such a nature that they must be banished from all scientific thought.

'Belief by suggestion' is unquestioning belief in a given statement made to the individual. When someone tells me that Mrs. Jones died last night, offhand I believe it although Mrs. Jones appeared to me last evening to be in the best of health. Most superstitious beliefs are of this nature. In one form of practical joking, 'pulling a person's leg', advantage is taken of this tendency of the organism to 'believe by suggestion'.

CHAPTER X.

LANGUAGE.

In studying the emotions we concluded that their expression was their very essence; a careful observer can tell another person's feelings by noting his expression. It does not always require careful observation; when a fox flies from his hunters he expresses terror in an unmistakable manner. The contention of those who encourage this form of 'sport', that the fox enjoys it, is absurd; the fox is telling them the whole time in his own language that he is terrified.

The above might be called an example of instinctive language. It is the language of 'gesture'. But let us examine some forms of intellectual language in which an animal voluntarily expresses his thoughts. When a dog sees you eating a biscuit and sits up on his haunches, he is telling you that he would like a piece of it; when a foreigner, unfamiliar with the English tongue, walks into a restaurant and points to his mouth, he is asking for food in the same language as the dog; and when a man beckons, he is saying in the same language 'Come here'. Such language has been called 'pantomime'.

A much more convenient form of language is one in which sound plays an important part, because it serves to attract another's attention when he is not looking your way. Many animals have a very limited sound language, generally of the instinctive variety; for example, a sheep has two such words, viz., 'Baa' meaning (perhaps) 'I am in distress' and 'Swish' meaning 'Look out! there's someone coming'. Ants are incapable of making much sound and I think I have read somewhere that they are deaf; accordingly they have to convey their ideas to one another in a tactile language, by means of their antennæ.

Man has the advantage of all these animals in having a language of words. The advantage lies in the fact that words

can be expressed by means of sound (spoken language) or light (written language) or even by the sense of touch (language of those who are both blind and deaf). Words are the symbols of our mentation and are to be regarded as psychical things whose physical basis is situated in the motor centre for speech in the third left frontal convolution of the brain. It is there that the ideational centre for the action of speech is situated; it is there that word and sentence motor-ideas arise. But we have already seen that our idea of any object, for example a violin, may be visual or auditory as well as motor; and the same is the case with words. We may have a visual idea of a word as it is written or printed or we may have an auditory idea of the word as it sounds when spoken.

We know that the visual idea of a word is formed (in right-handed people) in the neighbourhood of the left angular gyrus. If the left angular gyrus of a right-handed man be damaged he can see a printed word as well as any of us but the word has for him no ideational content; it might as well be Chinese. Such a patient is said to be suffering from word-blindness. Word-vision is only a special department of visual perception and the word-vision centre in the left angular gyrus is only a part of the area for visual-perception in general. The right angular gyrus participates with the left in the perception of objects other than words.

Similarly the word-hearing centre is a part of the centre for auditory perception in general and is situated in the first temporo-sphenoidal convolution. The corresponding convolution on the right side participates with it in the perception of sounds other than words and perhaps music. The physical basis of perception of such sounds as that of a soda-water siphon in action or of paper being torn lies in the first temporo-sphenoidal convolution of both cerebral hemispheres.

Lastly there is a motor centre for written language situated in the neighbourhood of the 'hand-area', anterior to the left fissure of Rolando. Patients unable to write, on account of a lesion of the writing centre, are said to be suffering from 'agraphia'. Loss of the motor-idea of writing is difficult to determine in these patients because of their physical disability (paralysis of the right arm and hand).

Speech, then, is a psychical thing consisting of word-ideas which are our *symbols* for other ideas. I wish particularly to

emphasize this point, because there appears to be a tendency to confuse speech with articulation, which belongs to a lower order of things altogether. Occasionally we hear it said that a person's 'speech' is tremulous, when it is meant that his 'articulation' is tremulous. The distinction is not merely academic; the student who confounds articulation with speech must of necessity confound their physical bases. The physical basis of speech is, as we have seen, in the ideational (association) centres; the physical basis of articulation is in the cortical projection areas and in the hypoglossal nucleus. In the exercise of our profession we are largely dependent on the word-symbols of our patients in our endeavours to arrive at a correct diagnosis; but if we confuse the physical (articulation) with the psychical (speech), we make a false start and lay a foundation for erroneous diagnosis.

CHAPTER XI.

THE EGO.

As conscious individuals each of us recognizes that there is in him something which is conscious ; it is that which we call ' I ' or psychologically our ' Ego '. In view of the doctrine which has in the present section been upheld that consciousness is dependent on sensations aroused by our environment, how does the development of a concept of the ' self ' come about ?

It has been pointed out that the feeling of self is very dear to us. When a man says ' I should like to be Andrew Carnegie ', he only means that he would like to be possessed of that man's wealth and capabilities. The man does not wish to change his identity ; that would involve the obliteration of the memory of his past life, of old friends and countless incidents whose recall is one of the greatest pleasures of existence. But that is not all which renders the concept ' self ' dear to us ; for in cases of double consciousness in which the subject has entirely changed his identity through disease, he has no desire to return to his former ' Ego '; indeed he does not know of its existence.

A little consideration will show that the concept ' self ' is a recombination of abstractions from many individualities. When a man says ' I am worth ten thousand pounds ', his ' I ' includes all his worldly possessions ; when he says over the billiard-table ' I am not worth playing with ', he refers to his billiard-playing self only. As a physician I care nothing about the ultimate nature of sensation ; as a psychologist I care very much indeed and perhaps some day I may care about it as a physician.

I should not deem it necessary to combat the notion that our material body plays an important part in our concept of self, were it not that some psychologists have lent their support to such a view. It is true that the self-idea is primarily dependent on physical sensations, as are all other ideas and concepts ; but

nobody at any time uses the word 'I' in the sense of my physical body. The idea never occurs to us that we leave part of our 'Ego' at the hairdresser's or the dentist's or at the surgeon's. Even the very earliest concept of our Ego does not contain the idea of our material body: a child will offer its toe a biscuit and a dog will run after its own tail.

Be this as it may we find on examination of the matter that each of us has many selves and that our Ego is a concept resulting from a recombination or abstraction of these. But such a concept differs in no essential particular from our concept of any other man. In thinking of the Ego in this way we regard it objectively: whereas its essential feature is that it is within *me*, is the subject of my knowledge. But when I begin to *think* of my 'Ego' it becomes at once an object of knowledge: it ceases to be that subject of knowledge which is thinking of it. We must therefore come to the conclusion that the 'Ego' is something unget-at-able. To quote the vigorous phraseology of the Right Hon. R. B. Haldane, M.P., it discloses itself as 'a mere asymptotic regress towards a notional pure subject of knowledge—a thinker without thoughts, an abstraction, nothing at all'.*

Personal Differences.

In the above account of the mental constitution of a normal individual we have already seen that certain differences exist between people. They differ in their ideational type, in their inherited tendencies and in the acquired tendencies which education and environment have given them. Some have a preference for saturated colours, others for neutral tints, and so forth.

It has further been determined that sensation is more acute in some people than in others. For example, sensibility to touch and pain is keener in town than in country folk, keener in whites than in negroes, keener among the educated classes than among the lower and probably keener in men than in women although Lombroso and Jastrow obtained opposite results in comparing men and women. Similarly men possess a keener sense of smell and of hearing than women. With Galton's whistle it has been found that, as a general rule, men can hear the shrillest notes

* 'The Pathway to Reality,' p. 154.

more often than women. On the other hand, the sense of taste is keener in women than in men, except for salt. There appears to be no marked sexual difference in the keenness of healthy vision.

Woman, then, is on the whole less sensitive than man. On the other hand, a woman's motor response to a stimulus is more ready than a man's ; she is less sensitive but more irritable or, rather, affectable. Insensitiveness and affectability, however, do not invariably go hand in hand, for town folk are more affectable than country folk and whites are more affectable than negroes ; while the lower classes are more affectable than the educated.

The general character of motor reaction in woman as compared with that in man has probably some connection with the relative muscular weakness of woman. Riccardi found that, in a series of attempts to exhibit their maximum force with a dynamometer, this was attained by the majority of women at the first attempt, by the majority of men at the second with the right hand ; but, with the weak left hand, both men and women attained their maximum on the first attempt.

Woman is quick of perception and ready of action. She takes in a situation at a glance and acts upon it ; man is more deliberate.

Fatigue shows itself in women more readily than in men. This may easily be demonstrated by getting a number of men and women to execute a series of rapid tapping movements with the finger on a Marey's tambour connected with a recording-drum. It is found that the movements become retarded and irregular sooner in women than in men.

Jastrow has observed some interesting sexual differences in the association of ideas. Experimenting with University students he got each of them to write down a word suggested by another word which he displayed on a blackboard before them. This process was repeated with several other words, and from the results he concluded that ' masculine preferences are probably for associations by sound (as man-can), from whole to part (as tree-leaf), from object to activity (as pen-write), from activity to object (as write-pen) and perhaps by natural kind (as cat-dog) ; while feminine preferences are for associations from part to whole (as hand-arm), object to quality (as tree-green) and quality to object (as blue-sky) '.

Woman is more emotional and leads a more instinctive life than man and this characteristic is nowhere better seen than in sexual relationship. 'A woman loves with her whole soul. To her, love is life; to a man, it is the joy of life'. Woman is altruistic, man is egoistic; and this difference, together with many others which have been pointed out is found to produce a marked influence on the insanities from which the two sexes suffer.

The Unity of Mentation.

In the above analysis of mentation it has been found possible to consider separately such part-processes as sensation, perception, ideation, conception, cognition, recognition, memory, judgment, reasoning, emotion, action, and so forth; but it remains to be pointed out that all these processes are interdependent and that each, considered by itself, is merely an abstraction.

As a matter of practical experience even the most primitive sensation aroused under strictest experimental conditions is a perceived sensation, and therefore a perception; and it has already been pointed out that the perception of an object is but an abstraction from the perception of space in general. Further, it is a matter of practical experience that the complete perception of any given object implies its cognition or recognition. The revival of a percept, the formation of an idea, implies an act of memory, as also does the formation of a concept. Again the formation of the simplest judgment, true or false, implies an act of memory whether it be reliable or erroneous. In the case of voluntary action, some idea of an action must be aroused before such action can be performed. A percept or idea must be experienced or perhaps a judgment formed ere an emotion can be aroused. Lastly it must be remembered that every psychical process has its accompanying emotional tone.

We find then that all mental processes considered in this first part of the volume are connected together indissolubly; and this is no more than might be surmised when we reflect on the enormous wealth of association fibres existing in the central nervous system between and among the physical bases of all these mental processes.

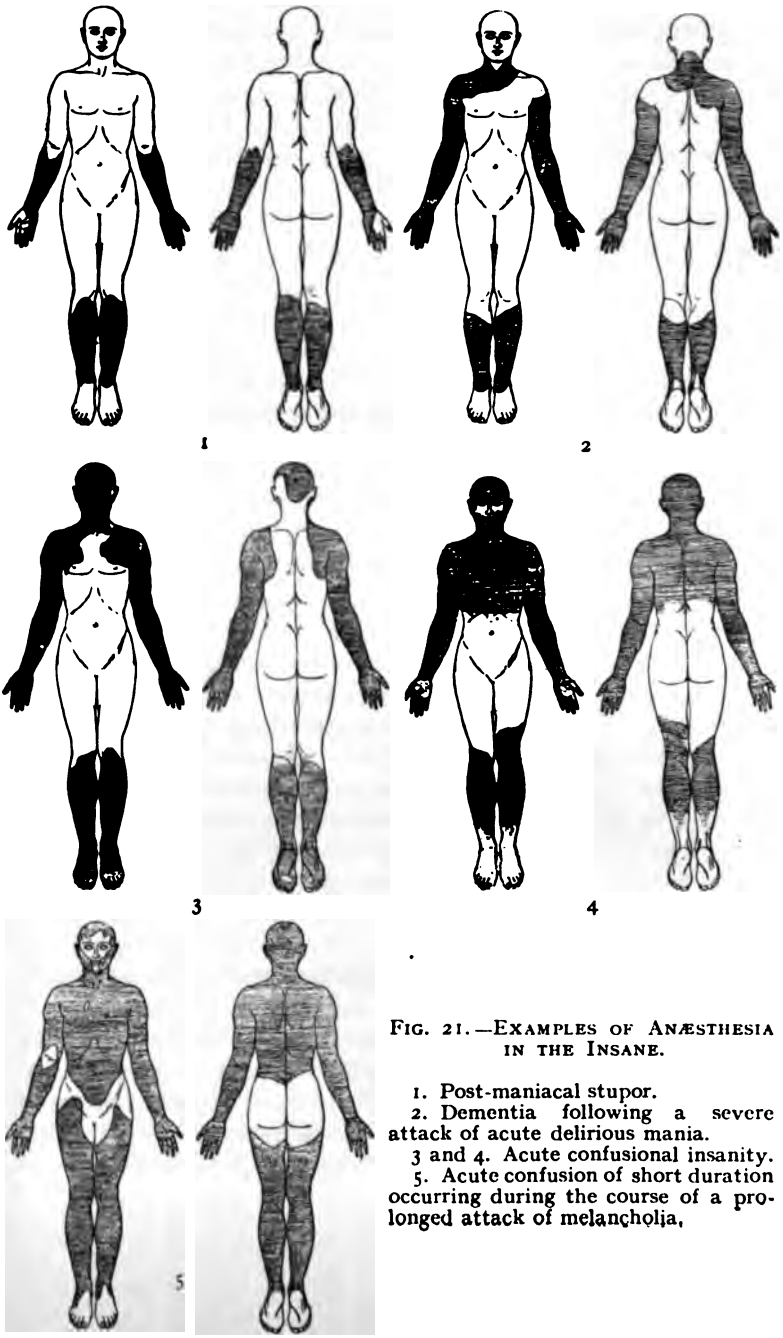

FIG. 21.—EXAMPLES OF ANÆSTHESIA IN THE INSANE.

1. Post-maniacal stupor.
2. Dementia following a severe attack of acute delirious mania.
3 and 4. Acute confusional insanity.
5. Acute confusion of short duration occurring during the course of a prolonged attack of melancholia.

PART II.

PSYCHOLOGY OF THE INSANE.

CHAPTER I.

DISORDERS OF SENSATION.

HAVING considered the way in which the nervous system subserves the mental functions of a normal individual, it now becomes our duty to consider in what way these functions are disordered in cases of mental disease. In doing so the several mental processes will be considered in the same order as in Part I.

Among the insane, sensation may be altered in one of three ways: there may be anæsthesia, hyperæsthesia or paræsthesia. Nearly all the senses may be thus affected and there is a vast field for research in this department of psychiatry.

Cutaneous Anæsthesia.—The several cutaneous senses may be considered together since they are simultaneously and more or less coextensively affected; nevertheless, owing to the difficulty of examining the insane, the best criterion of insensibility is their response to the prick of a pin. Cutaneous anæsthesia occurs most commonly in stuporose and confusional states. I have met with it in the stadium debilitatis of acute mania, in katatonia, exhaustion psychoses, hysterical insanity, in alcoholic and epileptic confusion and in many cases of advanced dementia. When most extensive the whole surface is anæsthetic with the exception of a small area in the neighbourhood of the external genitals and the soles of the feet. The unaffected areas commonly resemble bathing-drawers and sandals or, when the anæsthesia is less extensive, knickerbockers and boots. In the latter case there is commonly a sensitive area in the middle of the face. Cases of less severity present

anæsthesia of the legs, arms (or forearms) and hands only. This anæsthesia in its smallest extent, as found in some cases of dementia, involves only a few small areas on the backs of the proximal phalanges of the fingers. In a few patients exhibiting extensive anæsthesia of this kind, evidence of *loss of muscular or articular sensation* is shown by their inability to pick up a pin.

As already stated this loss of sensation is most conveniently investigated as analgesia by noting the response of the patient to a pin-prick in various parts of the skin. Most patients with this anæsthesia are stuporose and confused and are therefore unable to make reliable statements about their symptoms; but in a few it is possible to determine that loss of sensation to touch and temperature exists more or less coextensively with analgesia, and it is justifiable to infer its existence in the remainder. It may be taken as a working rule that there is no anæsthesia of this nature in a patient who retains sensation on the back of the hands.

On account of the fact that acute maniacs will strip on the coldest day in winter, run into the open ward when covered only with a thin cotton nightdress and open all the windows, it has been inferred by some authors that they are insensitive to cold. This inference is, I believe, unwarranted since it is impossible to detect any loss of the cold-sense on careful examination of maniacal patients during the acute stage. The tendency of acute maniacs to strip is to be accounted for by their general hyperæsthesia and their actions are explicable by their general motor restlessness; they are quite as well satisfied to close an open window as to open a closed one.

Diminution of the visual sense occurs in some patients. Those with the peripheral anæsthesia above described frequently have contraction of their visual fields, directly proportionate in amount to the extent of the cutaneous anæsthesia. From the fact that they will stare at the sun without apparently suffering any inconvenience it is supposed that retinal sensation is diminished in some dements, idiots and criminals; but this retinal anæsthesia must not be accepted as a fact until it has been experimentally demonstrated that these patients are unable to detect such minimal visual stimuli as are visible to a normal individual. The apprehension of colour remains apparently undisturbed in acute cases of insanity, but in arteriopathic dementia and in exhaustion (disorders accompanied by

imperception) there is failure of discrimination among the unsaturated colours and among shades intermediate in the spectrum between the primary colours. This is especially the case with greens and blues.

The sense of hearing, as tested by the distance from the ear at which the tick of a watch may be heard, is deficient in dementia and in general paralysis. In the latter this symptom is occasionally observed in the early stages, the friends of the patient volunteering deafness as one of his symptoms on giving a history of the case. Many senile cases of melancholia and in a less degree arteriopathic cases are unable to hear tones of very high pitch such as are obtainable from a Galton's whistle. Deafness is occasionally the cause of mental disorder as in certain cases of deaf-mutism; it favours the onset of auditory hallucinations and even in the sane is apt to give rise to the suspicion that others, taking advantage of the patient's infirmity, are talking about him. The deaf are thus peculiarly liable to insanity.

The senses of taste and smell are diminished in dementia, general paralysis and in some exhaustion cases. It has been stated that there is also loss of taste and smell in anergic stupor; the statement is probably true, but it rests on very slender foundation. Some melancholiacs cannot appreciate flavours.

The genital sense is usually diminished in melancholia, epilepsy, senile dementia and, after the initial stage, in general paralysis.

The only **visceral sensations** whose disorder demands special notice are those associated with the alimentary canal. The appetite is lost in a very large number of the acute insanities; this is so marked a symptom in melancholia that in many cases there is absolute loathing of food. In katatoniac excitement also, loss of appetite and consequent refusal of food are the rule; these symptoms are but occasional incidents in other forms of excitement. Loss of the sense of distension of the rectum is not an infrequent occurrence, especially in melancholia and in the tabetic form of general paralysis. In the latter case it is a symptom of the tabes, not of the general paralysis. This symptom is not to be confounded with loss of the instinct of cleanliness, such as occurs among advanced dements and other degraded patients. The condition here referred to may be instanced by quoting the case of a melancholiac musician who, when his mental symptoms had apparently passed off, would sit at the piano and play the instrument brilliantly until

he felt that he had unconsciously evacuated his rectum during the performance. He completely recovered from his attack.

Similarly the sense of bladder distension may be absent in some cases.

Hyperæsthesia of the various senses is difficult to determine. Most observers are agreed that the symptoms of acute mania justify the conclusion that all the senses are abnormally keen in that condition. Hyperacusis of hearing is undoubtedly common among maniacal patients; they can often hear a whispered conversation at a distance of ten or fifteen yards. In cases of neurasthenia and hysteria it is common for any or all of the senses to be exalted; and melancholiacs are peculiarly sensitive to noise.

The genital sense has been supposed to be hyperæsthetic in the early stages of general paralysis on account of the increase of the sexual instinct. It is found on inquiry, however, that there is no increase of the genital sense proper; the desire for sexual intercourse is undoubtedly increased in general paralysis, but the patient is frequently unable to complete the act and he is as likely as not to go to sleep in the middle of it. In cases of extreme peripheral anæsthesia the pelvic area, being the only sensitive part of the surface, dominates the consciousness of the patient and he is apt to commit indecent acts, especially to masturbate. It would be erroneous to conclude that in these cases there is *true* hyperæsthesia of the external genitals, since the rest of the cutaneous surface is anæsthetic; there is *relative* hyperæsthesia.

Increase of the appetite for food must be distinguished from increase of the eating instinct. The general paralytic and the chronic dement in some stages eat enormously, not so much because they are hungry as because they are greedy. Some maniacs eat enormously because of their enormous appetite; and there is one disorder in which increase of the appetite for food is one of the most marked symptoms, viz., hypochondriacal paranoia. Hypochondriacs are always hungry.

Paræsthesiæ of the various senses are of frequent occurrence among the insane; they are of the nature of simple illusions or hallucinations and are therefore considered under these headings.

Erroneous localization is a symptom which frequently occurs in cases due to coarse lesions of the cerebral cortex and in some lesions of the spinal cord; but it occurs very seldom in functional

disorders. In my practice I have met with only one such case: the patient was suffering from epileptic confusion and extensive anæsthesia, sensation being retained in small patches in the groins and on the soles of the feet only; there was also contraction of the visual fields. The interesting point about this patient was that, in the areas which retained sensation, a stimulus (pin-prick) was invariably referred to the corresponding spot on the opposite side (allocheiria).

Whether the duration of sensations in the insane differs from that of the sensations of the healthy has not been investigated.

CHAPTER II.

DISORDERS OF PERCEPTION.

THERE are three disorders of perception, viz., imperception (including 'inertia of ideation'), hallucination and illusion. An example of each will suffice to explain the meanings of these terms. Let us start at the beginning. When a cigar lies on the table before me and I see it and know that it is a cigar, the process is one of perception; when there is nothing on the table and I think of some cigar lying there, the process is one of ideation; when there is a pencil lying there and I look at it and see, not a pencil, but a cigar, the process is one of illusion; when there is nothing on the table and I see a cigar lying there, I experience an hallucination and lastly, if a cigar lies on the table and I see it but cannot tell what it is, I am suffering from imperception.

IMPERCEPTION.

During the last few years, this symptom has also been called 'agnosia'. Patients suffering from imperception or agnosia are able to see, hear, feel, taste and smell objects in their environment; but they are unable, in spite of extended previous experience of such objects, to place ideational content in the sensations aroused by them.

The student is already familiar with such a state of affairs in the domain of word-perception. Patients suffering from word-blindness can see the printed pages, but they cannot read them; the words convey no meaning. If you address a patient suffering from word-deafness, he hears you, but he cannot understand what you are saying. You might as well address him in ancient Greek. Here we have to deal with verbal imperception or verbal agnosia. With these special forms of imperception we shall deal in a later section; I am now speaking of imperception, not of verbal symbols of objects, but of the objects themselves.

If a patient is given a bottle of oil of cloves to smell and he tells you that he can smell it, that the odour is familiar, but that he cannot tell what it is, he is suffering from olfactory imperception. If you give him syrup to taste and he tells you that he can taste it but cannot tell what sort of a taste it is, he is suffering from gustatory imperception. If you show him a button-hook and he cannot tell what it is, he is suffering from visual imperception. If you jingle a handful of coins behind his head and he says that you are shaking a box of pills, he is suffering from auditory imperception. If you place a pair of scissors in his hand and get him to feel them without looking at them and he says that the object is a key, he is suffering from tactile imperception, sometimes incorrectly called 'asteriognosis.'

It must be left to the physician's own resources to provide himself with convenient tests for imperception. Inasmuch as there are various degrees of imperception it is advisable for him to carry in his pockets a few objects of unusual construction such as a fancy match-box, a pencil-case and a knife with some uncommon implements in it. I have a small metal paper-knife with a good-sized lens in the handle, which is usually somewhat of a puzzle to arteriopaths. Such sounds as the tearing of paper and the 'siss' of a soda-water siphon in action are good tests for auditory perception.

Pictures are useful tests for visual perception. For severe cases I use one of Dean's rag-books for children, called 'Baby's Object-Book'. It contains pictures of several common objects with their names printed below; and a patient under examination is required to recognize the objects depicted therein, the names being covered up. In order to detect slighter degrees of imperception I use another picture-book for children, entitled 'Proverbs Old Newly Told'. Each picture represents some well-known proverb which the patient under examination is required to recognize, the proverb itself being covered up. Of course, only those pictures which tell their tale well should be employed.

The name 'asymboly' has been given to a form of imperception in which only the terminal stage of perception is wanting, the stage in which a given object has to be referred to some concept derived from the past experience of the individual. For example, a man is shown a button-hook. He says: 'This is evidently a handle, and this is evidently a hook for holding

something.' You reply: 'Quite right; what is the article?' He replies: 'I don't know; it is just a hook for holding something.' Again, you place a half-crown in his hand, without allowing him to see it. He says: 'That is a metallic disc with a thickened rim; the edge of it is rough, and there appears to be an embossed design on either side of the disc.' You reply 'Well, cannot you tell me what the article is?' and he answers 'No, I can tell you nothing more about it.' You then tell him to look at it, and he will probably say: 'Why, it's a half-crown!' —Tactile asymboly or asteriognosis.

Agnostic perseveration or **ideational inertia** is a symptom closely allied to imperception. Patients exhibiting this phenomenon appear to be unable to get rid of an idea. A few examples will serve to illustrate the symptom. A man is shown a pencil; he recognizes it and says it is a pencil. He is now shown a match-box; he says it is a box for holding pencils. He is next shown a paper-knife; he says it is a knife for sharpening pencils. Take another case: A patient is shown a button-hook; he recognizes it and says it is a button-hook for fastening boots and shoes. He is now shown a knife; he says 'That is for boots and shoes, too!' He is next shown a silver match-box; and he says 'That also is for boots and shoes', and so on.

Imperception like other symptoms of mental disorder exemplifies the principle that dissolution is a reversal of evolution. There is a stage in the history of every child in which true perception of an object does not occur because the child has not yet had experience of such objects. In dissolution the adult reverts to this stage, his ability to take advantage of his previous experience having been obliterated by the ravages of disease. Ideational inertia is also met with in childhood, generally about the fourth or fifth year. Those who have had experience of children will think of many instances.

The Physical Basis of Imperception.—Imperception occurs in association with disease of the cerebral arteries, in states of exhaustion, in acute and chronic alcoholism and in other intoxications. Now these are exactly the conditions (intoxications and interference with the blood-supply) which are known to react most unfavourably upon the synapses.* We may

* Sherrington, 'The Integrative Action of the Nervous System,' chap. i.

therefore safely assume that the physical basis of imperception consists of an increase of synaptic resistance within the association-areas. This same increase of synaptic resistance will account for the phenomena of ideational inertia.

Hallucinations and Illusions.

An **hallucination** may be defined as *a percept experienced in the absence of any peripheral stimulus to cause such percept.* In **illusion**, *peripheral stimulus is present, but not that stimulus which would normally cause the particular percept experienced.* For example, if a person sees a ghost on a pitch-dark night or hears bells ringing when all is silent, he is suffering from an hallucination; but if a will-o'-the-wisp appears to him as a ghost or if he mistakes the chirp of a cricket for the sound of church bells, he is suffering from an illusion. It must be distinctly understood that the hallucinated person does not *think* he sees a ghost, he does see a ghost; he does not *think* he hears bells, he does hear bells.

Hallucinations are classified according to the sense-modality in which they are experienced; thus there are hallucinations of vision, hearing, smell and taste. There are also hallucinations of touch, pain and temperature, sexual hallucinations and psychomotor hallucinations of movement.

These perversions of perception may occur in the sane as well as in the insane. They are familiar to all of us in dreams and in the hypnagogic state (state between waking and sleeping); and, according to Dr. Head, they are liable to occur in association with the pain of visceral disease. In the sane visual hallucinations are more common than auditory; in the insane the reverse is the case. Auditory hallucinations are more liable to occur in the insanities of later life, visual in those of early life.

Hallucinations are either simple or complex, the complex being mostly auditory or visual. To the class of simple hallucinations belong vague shadows or flashes of light (photopsia), buzzing in the ears and hallucinations of taste and smell. To the class of simple illusions belong such paræsthesiæ as the epigastric and abdominal sensations described below; parageusia in which the food tastes as filth, and 'secondary sensations'. Some of these simple sensations are of considerable assistance in helping us to understand the nature of hallucination and therefore require careful consideration.

About 27 per cent. of the insane suffer at some time or other from the 'epigastric sensation', or from some allied sensation in the neighbourhood of the abdomen or lower part of the chest. This sensation is usually described as a sinking feeling but it may be a feeling of fulness or even of pain. In its commonest form it is experienced by the healthy on the receipt of bad news; and it was owing to the frequent occurrence of such sensations that the ancients regarded the heart, liver, spleen and intestines as the seat of the passions. Even to-day we hear of a 'hard-hearted' man 'venting his spleen' against another and the same notion has given us the names 'melancholia' (black bile) and 'hypochondriasis' (under the ribs).

Epigastric and allied sensations most commonly arise in confused and stuporose states. The epigastrium is its commonest situation, but the umbilical region, the hypogastrium and even the external genitalia are frequent sites of similar sensations. They are occasionally referred to the sternal region and it is probable that such symptoms as 'globus hystericus', 'neurotic spine', 'hysterical hip' and 'hysterical shoulder' are of the same nature.

A large number of cases presenting the above symptoms have also peripheral anæsthesia; and, conversely, all patients with well-marked peripheral anæsthesia, who are capable of making any reliable statement about the matter, when interrogated as to the presence of an epigastric or allied sensation, answer in the affirmative and it may be inferred that the sensation exists in all such patients. Further, although some patients have the abdominal sensation without obvious peripheral anæsthesia, many of these tell us on examination that they do not feel a pin-prick so well on the hand as on the trunk. It is therefore justifiable to conclude that patients having the abdominal sensation have more or less peripheral anæsthesia, in some cases to a very slight degree, occasionally so slight as to elude detection. One patient in Bethlem Hospital, whose symptoms suggested such a view, was a neurasthenic who complained simultaneously of a 'burning sensation' in the hypogastrium and of 'loss of feeling' in the legs, but I was unable to detect by examination any objective loss of sensation in the legs.

It is therefore to be concluded that the epigastric and allied sensations arise in those cases in which, owing to an affection of the cerebral cortex, there is some loss of sensation in the

peripheral parts of the organism. In patients with anæsthesia of this distribution, consciousness is mostly dependent on sensation derived from the abdomen, the more or less anæsthetic parts contributing little or nothing to the content of consciousness. The abdomen and neighbouring parts thus 'have greatness thrust upon them' and claim a large amount of attention; in this way they become the seat of abnormal sensations.

The epigastric aura of epilepsy is a particular example of epigastric sensations in general; it occurs when the patient is losing consciousness, in other words, is losing sensation; and it may be inferred that loss of sensation at the onset of an epileptic fit sets in at the periphery, that the patient at this stage experiences the epigastric aura and that the last event before the patient falls is loss of sensation in the abdomen. At present, however, there are no observations to confirm or refute this hypothesis.

Secondary sensations are those which accompany sensations of another modality; for example, many people experience with every auditory sensation an accompanying visual sensation: the tone G is perhaps associated with the colour red and the tone D with blue. Similarly sensations of colour may accompany perceptions of taste, smell, touch, pain, heat or cold: they are called 'photisms'. Again, there are secondary auditory sensations called 'phonisms', secondary taste sensations called 'gustatisms', secondary smell sensations called 'olfactisms', and so on. These secondary sensations are here mentioned because they throw light on the nature of hallucinations and illusions by demonstrating that, at least in some people, the visual centre may be stimulated by way of association-fibres from the auditory, gustatory, olfactory and other centres and, *vice versâ*, that each of these centres may be stimulated by way of association-fibres from any other centre. Secondary sensations are not especially associated with insanity. The nearest approach to them encountered among the insane occurs in some cases of simple melancholia. Some of these patients say that an object, usually white or black, will appear, for example, green for a few seconds. This phenomenon would be classed as a simple illusion.

Complex hallucinations of hearing are usually 'voices', sometimes a babble of voices so that the patient is unable to distinguish what is said, sometimes a single voice making taunting

or other offensive remarks ; occasionally there is even greater complexity, as in the case of a patient who used to hear lectures an hour long on Chinese literature, a subject of which he knew nothing. It must not be supposed that these ' voices ' are indistinct and muttering ; on the contrary, they are usually distinct and often very loud, so loud indeed that I have met patients to whom it was necessary to shout in order to be heard above the voices. In some cases the voices assume a tone of command ; such hallucinations are particularly dangerous since the patient is apt to obey any hallucinatory suggestion to commit suicide or homicide. In some cases there are two voices, one persecuting the patient and the other taking his part ; it is said that such a condition invariably points to chronicity.

Other complex hallucinations of hearing are church bells or music, sometimes of an orchestra in which the various instruments can be clearly distinguished.

The apparent source of an auditory hallucination varies in different patients : in decreasing order of frequency it is (1) overhead, (2) under the floor, (3) on the same level as the patient's head. This order of frequency has obvious relationship to the facts mentioned on p. 38.

The rôle of the ' unity of ideation ' in determining the source of an hallucination of hearing is dealt with later.

It has been said that, when hallucinations of hearing are constantly referred to one side, the symptom is indicative of coarse brain disease ; this is not in accordance with general experience. In cases of unilateral deafness from any cause auditory hallucinations are liable to occur on the deaf side only, but a few cases are recorded in which the hallucinations were on the opposite side to the deafness. Apart from such patients the affected side is usually the left and the patients thus afflicted commonly show hysterical symptoms, especially comparative hemi-anæsthesia of the right side. These conclusions are derived entirely from observations made on right-handed patients.

The deaf, but not the congenitally deaf, are especially liable to hallucinations of hearing ; it is said that Beethoven after he became deaf heard in hallucination many of his earlier compositions.

Auditory hallucinations are, as a rule, of evil prognostic significance ; the exceptions to this rule may sometimes be

recognized by getting the patient to ascertain whether he can still hear the sounds when his ears are stopped. In the majority of cases they are no longer heard ; but if they still persist, the prognosis is more favourable since the patient either believes or may be reasoned into the belief that the sounds are hallucinatory. The result is obviously one of expectancy on the part of the patient since the question whether he will or will not hear the sounds with his ears stopped depends on the depth of his belief in their reality ; and the physician has already done much toward the relief of his patient if he has convinced him of the hallucinatory nature of the sounds he hears ; he has given him considerable insight into the nature of the malady. This can occasionally, though rarely, be done by a suggestion to the patient that, when he tries the experiment, he will hear the sounds with his ears stopped.

Complex hallucinations of vision usually take the form of ' faces ' ; but in some patients they attain the most extraordinary complexity. Dr. C. E. Beevor once told the author of an epileptic whose aura consisted of the following visual hallucination : Thirteen men stood before him, the first turned and walked away, the second turned and walked away, the third did the same, and so on until the last man hit the patient, and he had a fit.

Visions may be pleasant or unpleasant. In some exhaustion cases they are so pleasing that the patients like to keep their eyes closed in order to enjoy to the full the beautiful scenes of their phantasy, while in delirium tremens the patient is terrorized by the horrible beasts he sees around him.

Sensations of light are experienced by normal individuals when pressure is made upon the eye or after it has been struck. Such sensations which are known as ' phosphenes ' are due to direct stimulation of the retina. Now in delirium tremens and, very rarely, in some other conditions phosphenes are liable to appear to the patient as pictures. Under such circumstances these apparitions are usually spoken of as hallucinations ; it is really more correct to call them illusions. They are easily induced by light pressure on the closed eyelids of the patients ; the figures in such apparitions are usually in movement.

Moving objects in hallucination usually pass from left to right or make their appearance to the left of the patient, advance and disappear in the distance. This is the rule for

right-handed patients; in left-handed patients the movement is usually from right to left.

Hallucinations of vision may occur in the blind; they may also occur in a single blind eye or even in a hemianopic field. In the last case they are usually of a simple variety (lights).

Visual hallucinations are usually black, white or grey, like shaded drawings, especially in the more chronic forms of insanity; coloured visions sometimes occur in the acute forms (exhaustion psychoses).

Tests of prognostic significance, similar to that mentioned in the case of auditory hallucinations, may be applied to visual hallucinations. The patient is directed to close his eyes when he has a vision; if it disappears, the prognosis is less favourable than if it remains. Hallucinations are never doubled by pressure upon one eyeball, because such doubling of objects is not a sufficiently common everyday experience to form part of a patient's ideational equipment. Hypothetically, if an hallucination were thus doubled the prognosis would be hopeless.

Hallucinations of both vision and hearing are most frequent at night when all is dark and quiet.

Hallucinations of smell may be pleasant or unpleasant. If pleasant the odour is compared to that of flowers, fruits or artificial scents; if unpleasant—and this is more common—it is compared to the odour of fæces, rotting corpses or something burning.

Dr. Savage has stated that there is some relationship between hallucinations of smell and disorders of the sexual organs and function. With this the author is disposed to agree, although the statement has not been allowed to pass unchallenged.

Dr. Hughlings Jackson has pointed out that the olfactory aura of epilepsy is frequently associated with a 'dreamy sensation'.

It is probable that many **hallucinations of taste** are dependent on a dirty condition of the patient's mouth and should therefore be regarded as illusions. They are almost invariably unpleasant and give rise to ideas of poison.

Hallucinations of pain affecting the cutaneous senses occur most frequently in some forms of delusional insanity, but not in paranoia. As a rule, they are referred to the neighbourhood of the abdomen and are described as electricity, magnetism, hypnotism or some other form of unseen agency. The patient

calls them painful prods, pricks, stabs, shocks or darts; but occasionally their unusual character may cause him to coin a new word (neologism); he is 'spreethed', 'spored', 'cheefened', 'torched', 'petered in a hodge-podge' or otherwise tortured by a 'teleform switch-battery service of blacklegs'.

Hallucinations of warmth commonly extend all over the surface of the body. They are common in melancholiacs and in cases of paralysis agitans; many of these patients protest that they feel quite warm when they are blue with cold. It is true that many melancholiacs make such protests in order to avoid the association with other patients round the fire, but there is no doubt that in many cases the statements are perfectly true. With other patients, again, the hallucination amounts to a feeling of actual heat causing them to believe that an unseen fire is raging around them. I have seen three such cases.

Hallucinations of cold are rare; they may occur locally or generally. In some cases a feeling of warmth is 'shot over' the patient and this is succeeded by a feeling of cold.

True **tactile hallucinations** are occasionally, but rarely, met with. Their most usual form is perhaps the feeling that insects are crawling over the skin; but it is possible that tactile hallucinations are frequently overlooked, since patients would not complain of them unless they were unpleasant. They are probably an element in the feeling of moisture, dryness or dirtiness occasionally complained of by patients, the other element being a sensation of cold or warmth. The occurrence of these hallucinations of moisture has given rise in the Italian school to the notion that there exists a distinct 'hygric' sense and they have been called 'hygric' hallucinations. One writer goes so far as to localize in the hippocampal gyrus a special centre for sensations of moisture.

The 'abdominal sensation' and its congeners are sometimes definitely tactile, but they are usually referred to the œsophagus, stomach, or intestines. Such sensations are then called 'visceral hallucinations'.

Sexual hallucinations are occasionally met with, not merely cutaneous sensations in the neighbourhood of the external genitalia, but specific sexual sensations accompanied by orgasm.

Perhaps the most interesting of all hallucinations are the **psycho-motor.** These consist of a feeling of movement of some part, without any movement actually taking place. Most

commonly, this feeling of movement is in the mouth, the patient feeling that he is saying words under compulsion. Patients often complain most bitterly that obscene and blasphemous words are thus forced, as it were, into their mouths, words which they would be the very last people to use in their normal state of health and of which they have an utter abhorrence. Such hallucinations may induce the patient to believe that she (for these notions are more common in women) thinks aloud or that people are able to read her thoughts. Psychomotor hallucinations may also be referred to other parts of the body. For example, one patient used to have the feeling that her arm had darted up and struck a nurse and she always had to be reassured that nothing of the kind had happened. Another used to feel her hand pass up to her head and pluck out a hair, although she could see her hand lying by her side. Another would complain that she was made to breathe too quickly or too deeply, her respiration being quite normal.

This last is one of the forms of the so-called ' respiratory hallucination '. Another feeling which some writers have described as a ' respiratory hallucination ' is that complained of by some melancholiacs of having no breath. The nature of this sensation will be more fully comprehended when the general principles of melancholia have been studied.

Hallucinations of the static sense sometimes occur. The author has notes of only two such cases ; both complained of feeling upside down and falling. One was suffering from acute confusional insanity ; he made a very fair recovery : the other was a Jewess suffering from katatoniac stupor ; she did not recover. In neither case was it possible to ascertain whether the sensation was that of falling head first.

One occasionally comes across an hallucination of such a nature that it is difficult to determine to which sense it should be assigned. As an example may be quoted the case of a Bethlem patient who feels the earth to be constantly heaving or trembling like a jelly under his feet. We cannot be quite certain whether this sensation is to be referred to the skin, muscles or joints. In this case it is of little consequence ; all we need to realize is that the hallucination is of cortical origin.

In the acute stage of delirium tremens and, very rarely, in some other mental disorders hallucinations may easily be suggested to the patient. If you say to him ' Look at that great

spider crawling towards you ', he will see a spider and be terrified by it ; if you say ' Listen to the noise of the machinery ', he will hear it and perhaps say that he hears engines of torture ; if you say ' Do you smell those flowers ?' he will reply in the affirmative, and so on.

Hallucinations of some kind or other occur in about 70 per cent. of the insane, hallucinations of hearing in about 50 per cent. In about 30 per cent. of patients one sense only is affected in this way, in 20 per cent. two senses are affected and in 10 per cent. three senses. A few patients suffer from hallucinations of five, six or even more senses.

At the beginning of this study of hallucinations a distinction was made between these and illusions ; but it has already been seen that it is not always an easy matter to decide whether a given sense-perversion should be classed under one heading or the other, especially in the domain of smell or taste. The same difficulty may arise in those cases in which illusions arise as a result of an irritative lesion of some sensory nerve. The false perception will be called an hallucination if a diagnosis of the irritative lesion has not been made. Again, it is a question whether the epigastric sensation should be regarded as illusion, hallucination or even percept.

Apart from these cases, illusions of whose nature there is no possible doubt are frequent in the insane. Many patients are liable to mistake the identity of those about them. The doctor is greeted as the patient's father, brother or husband and the matron as sister or mother. At Bethlem Hospital the head male attendant is constantly mistaken for His Majesty the King, especially by exhausted patients, although that official bears no extraordinary resemblance to our gracious Sovereign.

The physical substratum of hallucinations and illusions will be clear to the student who has grasped the fundamental principles of normal perception and ideation.

Our studies in the first section of this manual taught us that perception consists of two part-processes, a physical and a psychical. The physical process in perception is the stimulation of an association-centre (ideational centre) by the mediation of a corresponding end-organ, the psychical process being the feeling that there is ' something there ', and ideational content is placed in the ' something-there '.

It is clear that, in hallucination and illusion, the psychical

process is identical with that of perception; the difference between these processes is therefore to be sought in the physical process and there is no difficulty in seeing wherein this difference lies.

For the sake of simplicity let us limit our considerations to the domain of vision and, for example, let us take the process of seeing an orange on the table. In perception, an orange lies on the table and I see it; in illusion, a biscuit lies on the table and I see an orange; in hallucination, I see an orange when there is nothing there.

Now by studying hallucinations in the insane the writer has determined that there is a negative as well as a positive side to the hallucination process. To keep to our example, the positive side is that I see an orange, the negative side is that I do not see the table in the neighbourhood of the orange. It is with the utmost difficulty that patients with hallucinations of vision can see objects in the neighbourhood of an hallucination image. And, during hallucinations of hearing, patients can hardly hear real sounds. I have known two patients with whom auditory hallucinations were unceasingly present and to each of whom it was necessary to shout in order to make my voice heard. Both these patients recovered and were not deaf when the hallucinations ceased. If, as in some cases, the negative factor is wanting, the patient voluntarily supplies it; exhausted maniacs frequently keep their eyes closed in order to favour the formation of pleasant visions or keep their hands over their ears in order to favour pleasant auditory hallucinations.

The probable explanation of the negative factor is that the neurons, which normally conduct sensations from the end-organ to the cortex, are dissociated from one another, probably by the retraction of gemmules. The positive factor, that I see an orange when there is nothing there, indicates that the ideational centre (angular gyrus) is stimulated by way of association-fibres other than the occipito-angular bundle. That this is possible is indicated by the existence of 'secondary sensations'.

The hallucinated state is also favoured by the absence of sensations of other modalities than that affected. It is for this reason that hallucinations are most frequent at night, when small stimuli by way of association-fibres do not pass unheeded, but induce a physical state with which a correlative 'something-

there ' psychical process occurs. The absence of other stimuli allows the affected sensory area to dominate consciousness, ideational content is placed in the ' something-there ', and the result is hallucination. This principle was illustrated by the case of a lady who, during the delirium of typhoid fever, was afraid to close her eyes at night because, when she did so, she heard in hallucination horrible sounds apparently proceeding from a discordant brass band ; during the day the music was pleasant and she would close her eyes in order to hear it. In this case visual stimuli were sufficient to inhibit the auditory hallucination.

The two factors, diminution of sensation and disturbance of association, upon which hallucination depends, vary inversely in the several conditions in which it occurs. For example, in the delirium of fever and in the motor excitement accompanying some states of exhaustion there is little anæsthesia and great disturbance of association, whereas in cases of nitrous oxide or chloroform inhalation there is marked anæsthesia and little disturbance of association.

Illusion differs from hallucination in that there is no peripheral dissociation.

It will not have escaped the reader that the physical mechanism of hallucination is precisely the same as that of ideation. The psychical differences are that the hallucination image is vivid while the ideational image is faint and that the ideational image is accompanied by a sense of past direction in time (then-ness) while the hallucination image is accompanied by a sense of the present (now-ness).

The above theory of the nature of hallucinations receives support from the fact that, under certain circumstances, mere suggestion suffices to induce hallucinations. They may be so induced in hypnotized persons and, by means of the following laboratory experiment, in normal individuals.

A blue bead, 1½ inches long by ¾ inch wide, is suspended against a black background. This is shown to an observer, who walks away from it along and to the end of a graduated line. He is then told to approach the bead slowly and to mention directly he sees it. This proceeding is repeated twenty times with each observer. Every now and then the bead is withdrawn by a concealed arrangement but it sometimes continues to be seen when it is not there by about two-thirds of the observers. In

this experiment the feeling of ' now-ness ' is artificially aroused in the observer, so that he does not realize that his percept is a revived one and the result is that he projects a vivid instead of a faint image ; in other words, he has a true hallucination.

Hallucination and illusion, then, are to be regarded as disturbances of the normal processes of ideation and perception, illusion being more nearly related to perception and hallucination to ideation.

The **ideational type of the insane** is difficult of investigation not only on account of their confused state of mind, but also because they are mostly unpractised in true psychological introspection. The small number of satisfactory observations which I have made in this direction do not warrant any conclusion being drawn.

CHAPTER III.

DISTURBANCES OF THE ASSOCIATION OF IDEAS.

THE association of ideas may be disturbed in one or more of three different ways: it may be (1) retarded, (2) accelerated or (3) there may be disorder of the normal ideational sequence.

(1) **Retardation of the flow of ideas** may arise as the result of (*a*) partial paralysis of the cortical neurons, (*b*) destruction of many of the cortical neurons, (*c*) incomplete development of the cortical neurons or (*d*) more or less extensive peripheral anæsthesia.

(*a*) The cortical paralysis here referred to is that which occurs in melancholia. The reasons for the belief that such paralysis is the physical basis of melancholia are fully discussed under that heading. It has been determined by means of the reaction apparatus that association-time is increased in all states of depression and it is a matter of everyday experience, not only that melancholiacs are slow of thought, but also that physiological melancholy is inimical to successful thought.

(*b*) Destruction of the cortical neurons occurs, or rather has already occurred, in all forms of secondary dementia, especially in that of general paralysis. In these cases retardation of thought is a pronounced symptom. It also occurs in most cases of organic insanity in which the destructive lesion is of wide extent and in association with degeneration of the cerebral arteries.

(*c*) Incomplete development of the cortical neurons in idiocy and imbecility presents a clinical picture, so far as the flow of thought is concerned, similar to that which is presented by their subsequent destruction.

(*d*) When, on account of cortical disturbance, a large area of the surface of the organism becomes anæsthetic, the process of ideation lacks much of its normal stimulus, the ordinary stimuli

to thought being sensations derived from various parts of the body, particularly from the organs of special sensation, including the skin. Hence we find that, in states of exhaustion, confusion and stupor associated with peripheral anæsthesia, thought is retarded to such an extent that it appears in many cases to be completely arrested.

(2) **Acceleration of the flow of ideas** occurs in maniacal excitement. Increased rapidity of association is to be inferred from the speech of an acute maniac. When he is incoherent, the flow of his ideas is so rapid that it is impossible for an observer to trace any connection between them, but at times it becomes possible to see their association. One example will suffice: the writer offered a cigarette to an acute maniac, who immediately remarked, 'Tobacco, Virginia, Virgin Queen, Elizabeth, my mother', as quickly as the words could be uttered. Such rapidity of association is impossible in a sane man; it is known as the '**flight of ideas**'. This tendency to rapid association in such patients is by no means a persistent phenomenon; it easily tires.

(3) **Disorder of the normal sequence of ideas** is characteristic of all states of excitement and is dependent upon lack of attention. It is perfectly true that the association of ideas in these morbid states obeys the ordinary laws relating to the frequency, recency, relative position and vividness of the associated idea; but whereas, in a normal individual, irrelevant associations are more or less inhibited by some interest in or attention to a goal-idea, in maniacal states such interest or attention is wanting and association becomes free and disordered from lack of inhibition.

It must not be supposed that patients with fixed delusions suffer from disorder of the process of association, so far as ideational sequence is concerned. The judgments are erroneous for other reasons which will be discussed in a subsequent chapter.

Disorders of Memory.

Of disorders of memory there are three, respectively known as amnesia or loss of memory, hypermnesia or excess of memory, and paramnesia or falsification of memory.

Amnesia.—There are two varieties of amnesia—(1) inability to retain new mental impressions (anterograde amnesia) and (2) inability to recall former mental impressions (retrograde amnesia). **Anterograde amnesia** may occur by itself, but retro-

grade amnesia is always accompanied by anterograde. The former variety occurs to a slight degree in severe cases of melancholia, to a greater degree in the mental degeneration of senility, and it is most marked in cases of anergic stupor and, in a way, in post-epileptic states and so-called masked epilepsy.

In seeking the cause of any disturbance of memory it is necessary to bear in mind the results obtained from experiments with the memory apparatus. It will be remembered that the tendency of an idea to be subsequently recalled depends on its vividness, on the amount of attention paid to it, on its frequency of recurrence and on the prominence of its temporal and spatial position in any given series of ideas.

Now in the several conditions in which there is inability to retain new mental impressions, it is seen on examination that the cause of the disorder of memory varies. The disorder is always slight in melancholia; but, when it occurs, it is entirely dependent on lack of attention to mental presentations. It is possible that this factor also plays a part in the causation of the memory disturbance characteristic of old age, but here there is another factor which must be borne in mind, viz., that with an old man a new idea stands out less prominently among his hundreds of thousands of previous ideas than with a young man whose ideas have been much less numerous. The hypothesis has been advanced that the cortex 'loses its plasticity' in old age. This phrase I take to mean that the cortical neurons work stiffly and are inelastic in their action, like the old man himself. It may be so.

In anergic stupor and in exhaustion states the chief factor in the causation of memory disturbance is more or less extensive peripheral anæsthesia, which destroys the vividness of all percepts. In this condition attention also is wanting and the result is that such patients completely lose the memory of the greater part of their illness.

In states of post-epileptic automatism and of masked epilepsy, patients are liable to perform most complex actions full of incident and yet be unable subsequently to remember anything about them. I do not know of any record of a systematic examination of patients in these conditions, but circumstantial evidence goes to show that there is neither loss of sensation nor lack of attention. All that we are able to say is that the con-

tent of post-epileptic consciousness is dissociated, at its onset and its close, from that of the normal consciousness of the afflicted patient. Dissociation from the previous mental content may easily be accounted for by the loss of consciousness, which is the essential part of an epileptic fit ; but what exactly happens when the patient returns to his normal condition it is at present impossible to say.

The deficient memory of imbeciles is mainly due to lack of attention.

We now come to the discussion of those conditions in which a patient is unable to recall previous mental impressions (**retrograde amnesia**). Such conditions occur during post-epileptic states, in states of exhaustion (confusional insanity), in secondary dementia of all kinds and in organic insanities.

The post-epileptic states have to be again mentioned in this connection ; because account must be taken, not only of the fact that incidents occurring in these states are subsequently forgotten, but also of the fact that during such states the patient forgets all about his normal life. There are, however, post-epileptic states in which loss of memory takes place in accordance with the law of regression to be presently described. The progressive loss of memory characteristic of dementia is invariably in accordance with this law.

The **law of regression** of memory is but a special application of the law of dissolution of the nervous system, that dissolution takes place in the reverse order of evolution. The earliest functions of the nervous system to be evolved are the least complex, the least voluntary, the most instinctive, and these ultimately become the most organized. The last functions to be evolved, and therefore the least organized and most unstable, are the most complex, the most voluntary and the least instinctive. Dissolution takes place in the reverse order, the most complex and least instinctive functions being the most likely and the first to become affected, and the least complex and most instinctive are the least likely and the last to become affected. We find that this law is applicable to the evolution and dissolution of memory. The memory of recent events goes first, that of remote events last ; and, in general, it is found that ideas are forgotten before actions. In the domain of language dissolution takes place in the following order : proper names, common nouns, adjectives and verbs, and lastly interjections, this

being the reverse order to that in which these parts of speech are acquired.

Occasionally a retrograde amnesia is only for events which are recent in relation to a given time. This condition was exemplified in a remarkable manner by a female patient, aged fifty-six, who was admitted to Bethlem Hospital on November 28, 1896, on account of an attack of insanity following head injury. On admission she was confused and used to nurse the pillow, saying that it was her newly-born son. On December 7, she said that this son was three weeks old, that the year was 'eighteen-sixty-something' and that her own age was thirty-nine. When asked whether she remembered Queen Victoria's Jubilee she remembered some public rejoicings about the year 1850 (apparently the 1851 Exhibition). On December 9 she said that she was aged forty-two and her son six years; on December 21, that she was fifty and her son twenty; and on January 3, 1897, when she had practically recovered, she stated that she was fifty-six years old and her son twenty-six. This was true.

In advanced dementia patients remember practically none of the incidents of their later life, but even in this condition the ordinary rules of memory hold good to some extent. For example, any incident which makes a profound impression is liable to be remembered. For this reason, if for no other, it is not wise to promise even the most advanced dement that his name will be placed on the next discharge-list, in the hope that he will forget. Such a promise may make an impression too profound to allow it to be forgotten.

The loss of memory in acute confusional insanity appears to be more extensive in its range than in the above conditions. In this state some patients forget even such thoroughly organized ideas as their own name, much less can they tell their whereabouts in space and time. The physiological explanation of these amnesiæ is as follows: in many of the above states, especially in anergic stupor, acute confusional insanity and advanced dementia, there is loss of sensation, which is at times very considerable. This is dependent upon damage to the cortical neurons (? synapses) and therefore to the ideational centres in which memory images are revived. Such damage is temporary in stupor and confusion, permanent in dementia.

It is found that, after recovery, all cases of epilepsy (masked

or otherwise) and of post-epileptic automatism, most cases of anergic stupor and some of acute confusional insanity have little or, in epileptic cases, no remembrance of the attack. The same may be said of many cases of traumatism to the head and of sudden organic brain lesion. Such events give rise to gaps in the patient's memory, mental scotomata or lacunæ which have been called **partial amnesiæ**. In most of these conditions this is easily accounted for by the fact that sensation, and therefore consciousness, is either abolished or at a very low ebb. On the other hand no satisfactory explanation has yet been offered to account for the loss of memory in post-epileptic automatism or masked epilepsy. To say that dissociation of the mental state takes place at its onset and close is, after all, merely a restatement of the facts in more obscure terminology. Another fact for which no satisfactory explanation has yet been offered is that, in many of these states, the patient loses memory of events which happened immediately (twenty minutes or so) before the cerebral shock occurred.

It will be observed that some of the phenomena described under the heading of imperception may also be regarded as instances of partial amnesia.

There are many tests which may be employed to determine a patient's memory for recent events. He may be asked to say what time of day it is,* what day of the week, day of the month, what month and what year. He may be asked what he had for his last meal. Marie employs the following tests: the patient is given three pieces of paper of different sizes and is told, for example, to fold the large piece into three and to put it under his pillow, to fold the medium-sized piece into four and give it to the nurse and to tear up the small piece and throw it out of the window. Another test devised by Marie is to tell the patient to go and tap three times on the window-pane, to open and close a given door, to return to his seat, make a military salute and sit down. Such tests as these usually bring out any defect of recent memory on the part of the patient.

As a test for the revival of memory images a patient may be asked to enumerate a dozen birds, animals or flowers. If he

* Most healthy people can estimate the time of day to within a few minutes, especially if they have seen a clock or met with some incident indicating the time within the past two hours.

fails to do so, his capability of reviving memory images is deficient; if he repeats himself, there is some loss of recent memory.

Hypermnesia.—In many cases of mania, especially of chronic mania, a condition is met with in which the patient has remarkable exaltation of memory. He can tell with perfect accuracy what happened to him or what he was doing at any given date since the beginning of his illness; or he can instantly recall the name of any person he has seen, perhaps only once, and that years ago, but since the beginning of his illness. This phenomenon is doubtless related to the general hyperæsthesia of these patients. Stimuli of moderate intensity arouse in them more vivid percepts than in normal people, and are hence more liable to attract their attention.

Partial hypermnesia is frequently observed in cases of imbecility. In these cases there is no general hypermnesia, but there is an exaltation of memory for ideas or incidents of a particular nature, which arouse their interest and attention. Other ideas and incidents have no interest for them, and for these their memory is exceedingly bad. Some of these patients have a remarkable memory for dates. One patient at Prestwich Asylum could enumerate all the occasions on which any given medical officer of the institution had played tennis.

Paramnesia.—We have already seen that an essential part of any act of memory is the emotional tone of familiarity. Now if this emotional tone should arise during an act of perception, the total process is one of recognition; and should the feeling arise during an act of ideation or conception, the total process is one of memory. In the insane, and occasionally in the sane, this mood of familiarity may arise without any justification; for example, (*a*) the mood of familiarity may arise in entirely new surroundings, with the result that the person so affected thinks he has 'been there before'; he *recognizes* his surroundings: (*b*) the mood arises in association with the idea, for example, of a visit from a friend, with the result that the person *remembers* the visit, which has not occurred. These abnormal psychic processes are known as paramnesia. Curiously enough, the latter process, which is the more complex of the two, has been called 'simple paramnesia', and the former has been called 'paramnesia by identification'. Such nomenclature is confusing. The two processes respectively should be spoken of as 'illusions of recogni-

tion ' and ' illusions of memory '. In thus naming them there is no misuse of the word ' illusion '; for paramnesia is practically a misinterpretation which originates in sensations, sensations derived from those muscular and arterial changes which underlie the mood of familiarity.

Paramnesia is liable to occur in any form of insanity in which the emotions become dominant, but it is most common in the variety of mental disorder usually associated with multiple neuritis, the so-called ' polyneuritic psychosis '.

CHAPTER IV.

DISORDERS OF THE EMOTIONS.

In this section we have to consider morbid modifications of the emotional reaction to percepts and ideas of situations and incidents in the outside world. In the insane such emotional reaction may be excessive or deficient, the cause of the excess or defect differing in the various diseases with which we have to deal.

Persistent states of depression and hilarity are common in many forms of mental disorder, especially in the intermittent and periodic insanities ; and it is better to defer their consideration until these varieties of mental disease are discussed. Hitherto no explanation has been forthcoming why general paralysis has such a remarkable tendency to induce a persistent emotional state of happiness and exaltation.

In those conditions which are dependent upon progressive deterioration of the nervous system, such as general paralysis, alcoholic insanity and epileptic insanity, emotional reaction is excessive, the most unimpressive word or gesture often sufficing to induce an attack of weeping or laughter. The same may be said of maniacal excitement. Again, paranoiacs and patients suffering from hallucinations are especially liable to outbursts of anger and other forms of emotion. Imbecility, too, is a condition in which excessive emotional reaction may be observed. We have also to consider those patients who suffer from morbid fears.

Deficient emotional reaction, on the other hand, characterizes confusional and stuporose states, myxœdema, cretinism, senility and all extreme forms of secondary dementia.

Excess of Emotional Reaction.

The doctrine is now well established that dissolution of the nervous system takes place in reverse order to its evolution and it has been demonstrated that the last motor tract to develop

in the history of the vertebrate nervous system is the pyramidal tract. It is in accordance with this doctrine that the first motor tract to suffer in such progressive degenerations of the nervous system as general paralysis, alcoholic insanity and epileptic insanity is the pyramidal tract ; and the consequence is that, in these diseases, motor impulses tend more and more to be transmitted by way of the more primitive motor tracts viâ the red nuclei.

Now these are the tracts which normally subserve the function of emotional reaction and so it happens that patients suffering from the above diseases react emotionally to unimpressive stimuli : their main outlet is by way of emotion-arousing tracts, the volitional tracts being unavailable.

In states of maniacal excitement the excessive tendency to emotional reaction is dependent upon a different set of conditions. In the chapter on intermittent insanity I shall show reason for the belief that mania is a state in which the neurons contain some irritating body or bodies ; the neurons are consequently in a permanent state of excitability. The result of this constant state of tension of the neurons in maniacal states is that minimal stimuli provoke nervous discharge and, in the case of motor neurons, induce muscular contraction.

The application of this principle to the emotionality of maniacal patients is as follows : a perceptual or ideational process occurs in one of the association-areas of the cortex ; all the neurons in functional communication with this area, especially the cortico-thalamic neurons, are discharged ; in other words, discharge takes place into the emotional regions of the nervous system.

The emotional outbursts of paranoiacs and of patients suffering from hallucinations may be looked upon as being due to excessive perception, in contrast to those forms of diminution of emotional reaction which are due to imperception (*vide infra*). The laughing or weeping of a patient, who has just experienced an illusion or hallucination, takes place because he has perceived something (which is not there) ; he has suffered from excess of perception.

Similarly paranoiacs suffer from excess of perception ; their association of ideas is excessive and they see hidden meanings in the most trivial incidents. A passer-by in the streets blows his nose and the paranoiac perceives the handkerchief as the

cloak of a sneer or smile ; the result is the emotional reaction we call anger.

Morbid fears are due to an abnormal tendency of the pristine nervous system to react to some particular percept. This tendency must, as a rule, be regarded as congenital since it develops in people who normally lack self-confidence. The tendency is, however, sometimes acquired ; there are diseases which induce permanent damage of the pyramidal system, leaving the cortico-rubral system more or less uncontrolled and the patient devoid of self-confidence. In other cases an unusual incident may initiate this morbid tendency in an unstable individual.

The excessive emotional reaction characteristic of the imbecile is to be accounted for in a similar manner. The nervous system of the imbecile and therefore his pyramidal system, which even in a normal child is developed late, are incomplete in development. Accordingly the pristine cortico-rubral system is uncontrolled, the volitional pyramidal system being unavailable to take over its usual share of the functions of the pristine system. It is this uncontrolled action of the pristine motor system which must be held responsible for the excessive emotional reaction of the imbecile.

Deficiency of the Emotional Reaction.

If you tell a person a good joke, there are three possible reasons for his not laughing at it : (1) He does not hear it, (2) he does not ' see ' it or (3) he is preoccupied. Such are the three causes of deficient emotional reaction among the insane.

In confused and stuporose states the patient suffers from anæsthesia of characteristic distribution. In such cases perception is deficient because sensations are not satisfactorily served up to the ideational centres and emotional reaction is absent for the same reason that a deaf man does not laugh when you tell him a joke. It is also to be observed that, in these patients, there is a further reason for the loss of emotional feeling in that the muscular sense is defective ; the patient would not experience an emotional feeling, therefore, even if slight motor reaction should occur.

Emotional defect may be due to partial or complete imperception. This occurs to a greater or less extent in cases of secondary dementia, arteriosclerosis, myxœdema, cretinism and

idiocy. In all these conditions there is corresponding deficiency of emotional reaction, for the same reason that some people cannot 'see' a joke.

In some cases of this kind emotional reaction occurs, but its character is inappropriate to the occasion. For example, it sometimes happens that an advanced dement laughs on being told that a relative, once dear to him, is dead.

Absence or deficiency of emotional reaction occurs in severe cases of melancholia. Professor Ribot mentions in his 'Psychologie des Sentiments' cases of melancholia in which there was complete absence of emotional reaction; but the name 'anhedonia' which he has given this symptom and the description of his cases indicate that he has not quite fully grasped its significance. Cases of severe melancholia suffer from an absence, not only of pleasurable, but also of painful emotional reactions. Such patients experience no pleasure when they think of their home, wife and family; they commonly tell us that they have lost all affection for their friends; and when it becomes our painful duty to inform a melancholiac of the death of his nearest and dearest relative he commonly remarks 'I don't seem to feel it'.

The cause of this lack of emotional reaction is not far to seek. As I shall point out in a subsequent chapter, the greater part of the muscular system of melancholiacs is rigidly fixed owing to partial paralysis of cortical neurons and Dr. Craig's observation that the blood-pressure of melancholiacs is raised indicates fixation of the involuntary arterial muscle-fibres. It is on account of this motor and vasomotor fixation that the motor and vasomotor changes essential to emotional reaction cannot take place.

Katatoniac stupor also is characterized by muscular rigidity. This rigidity differs from that of melancholia in that it affects the whole of the muscular system uniformly, whereas the rigidity of melancholia affects mainly the musculature of the spinal column and of the large proximal joints. Dr. Craig tells me that the blood-pressure is also raised in katatoniac stupor. The practical point is this: that in katatoniac stupor there is motor and vasomotor fixation as in melancholia and it is on account of this fixation that there is deficiency of emotional reaction.

Professor Kraepelin considers that there is an absence of emotional reaction in other forms of dementia præcox.

The conclusions arrived at in this section may be summarized as follows: Excess or defect of emotional reaction may be dependent upon excess or defect of sensation or upon excess or defect of perception. Excess of emotional reaction may also depend upon an abnormal tendency of motor impulses to be transmitted viâ the pristine emotion-arousing nervous system. Defect of emotional reaction may further be due to fixation of the emotion-arousing musculature.

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CHAPTER V.

ABNORMALITIES OF ACTION (DISORDERS OF CONDUCT).

DISORDERS OF VOLITION.

THE insane are liable to perform all sorts of abnormal acts as the result of insane delusions. Of such a nature are the setting of traps in order to ensnare supposed persecutors, the barricading of doors to prevent the ingress of supposed enemies, the plugging of keyholes to prevent poisonous gases being instilled into the room, the wearing of concealed armour, and the more ostentatious wearing of fantastic dress, tinsel crowns and self-conferred medals. I have known a patient, suffering from the delusion that she was infectious, eat such refuse from her food as nut-shells and fish-bones lest these should convey infection to another person. All such voluntary acts are liable to degenerate in time into automatic acts; they are then known as ***insane habits.*** More important still are the drug habits (alcohol, morphia, cocaine etc.), which will be considered in their proper place.

Paralysis of volition, *i.e.*, paralysis of the capacity of forming a clear idea of a movement to be performed, is known as **apraxia.** This is paralysis of the 'highest motor level' of Dr. Hughlings Jackson, which is situated in the left prefrontal lobe, not paralysis of the middle level whose cell-stations are in the Rolandic motor areas. Apraxia consists of an inability on the part of the patient to perform certain actions, although he shows no sign of inco-ordination or paralysis of movement or sensation. If such a patient be told to raise his arm, to point at an object or to shut a book he makes movements which are quite inappropriate. If he be shown a candle, given a box of matches and told to light the candle, he appears to have no idea of the movements required for such an action.

There are two varieties of apraxia, sensory and motor.

Sensory apraxia is dependent on imperception or agnosia (*vide* p. 105). In this form the patient is unable to perform a given action, because he does not recognize the nature of the article which he is required to use for such an action. For example, a man is shown a pencil, but does not recognize it as a pencil; he does not know what it is because his perception is defective. If now he is told to write something with the pencil, his movements are confused; he makes no attempt to write, because he does not grasp the elementary idea that the article in his hand is an implement for writing.

There is another form, **motor apraxia,** in which, to keep to the same example, the patient knows that he holds a pencil in his hand and knows what it is for; yet when he is told to use it he fumbles with it and appears to have no idea of the movement of writing. It is a good test for motor apraxia to get the patient to measure some object with a tape-measure.

In order to detect slighter degrees of apraxia it is a useful test to get the patient to perform a given action, without all the articles required for such action. For example, give him a button-hook and tell him to go through the movement of fastening a button with it; in other words, to pretend to fasten a button. The resulting movements in a case of apraxia are nothing like the right movements although the patient may be able to button his own boots. As a still more severe test he may be asked to show how he would count out change (money), but without any coins; he will perhaps go through a series of movements as if he were dealing cards. If you hold out your hand to him as if to receive the coins he will perhaps shake hands with you.

Ideational inertia is sometimes observed in apraxia, as in imperception. The following excellent example has been recorded by Dr. S. A. K. Wilson. The patient was given a match, which he recognized as such. He was then asked 'How would you use it?' He replied 'I would strike it, like that' (imitating the movement). He was then shown a pencil, which he also recognized. On being asked how he would use it, he replied 'I would strike it, like that' (again performing the movement of striking a match).

A patient of mine was shown a lens. He called it an eyeglass and put it to his eye. He was now shown a penknife; he called it a penknife but put it to his eye as if to look through it. He was next shown a pencil; he recognized it as a pencil, but put it to his eye as with the other objects.

Apraxia is a very characteristic symptom of degeneration of the cerebral arteries, especially of arteriosclerosis and syphilitic endarteritis. It is also met with in post-epileptic states and during the recovery of general paralytics from apoplectiform attacks. It is also commonly seen in states of exhaustion, in acute and subacute alcoholism and in severe cases of the polyneuritic psychosis.

Apraxia is a good illustration of the principle that dissolution is a reversal of evolution. In every child, and indeed in every adult, there is a certain amount of difficulty or disability in performing a new, unpractised voluntary action; and apraxia is a reversion to this condition, but it differs in that there is disability in the performance of well-practised voluntary actions. When my housemaid takes upon herself to place my tennis-racquet in its press, she inserts it at the side instead of at the end of the press: this is an example of apraxia during evolution.

In functional and organic disorders of the *middle motor level* (Rolandic area), there is paralysis of voluntary movement, although the patient has a clear idea of the movement he wishes to perform, the motor ideational centre in the left prefrontal lobe being intact. Such paralysis of voluntary movement occurs as the result of coarse brain disease such as thrombosis, embolism, hæmorrhage, abscess, tumour etc., destroying the excitable motor areas of the cortex.

Such lesions are usually of fairly rapid onset and cause local paralysis. In general paralysis, on the other hand, there is a slow, insidious, diffuse, chronic, progressive cortical lesion gradually destroying the cortical neurons, especially those subserving the function of voluntary movement and there is a corresponding progressive paralysis of volition.

Among the so-called functional mental disorders the most typical example of paralysis of volition is melancholia. In severe cases of this disease the patient stands motionless and silent and no voluntary movement takes place for weeks and months together. This paralysis affects the muscles of the spinal column and of the large proximal joints most, the muscles of the hands and feet being affected to a very small degree or not at all. In milder cases the patient merely complains that he is 'unable to do things'. As in most cerebral palsies, a certain amount of rigidity accompanies this paralysis.

There is a form of katatoniac stupor in which a somewhat

similar muscular condition obtains. The patient stands motionless and silent, just like a melancholiac ; but the rigidity is even more marked and its distribution is uniform, so that the joints of the hands and feet are as rigid as those of the shoulders, hips and spinal column. This rigidity sometimes involves the face muscles (Snautz-krampf).

Anergic stupor is another condition in which there is paralysis of volitional movement. In this state the patient suffers from peripheral anæsthesia of the kind already described, so that ingoing stimuli are usually insufficient to arouse the idea of movement. It will be shown later that primary motor paralysis also obtains in this disorder.

The lack of volitional movement in dementia is largely due to partial anæsthesia, ingoing stimuli being insufficient to induce the movement-idea.

Partial or complete anæsthesia is also to be held responsible, to some extent, for the paralysis of volitional activity occurring in states of intoxication due to alcohol, chloroform, chloral, morphine and allied drugs.

The paralysis in fatigue is due, as we have already seen, to the accumulation of certain products of metabolism in muscle substance.

Increase of volitional* activity is commonly known as ' pressure of activity '. In maniacal states this occurs mostly at the large proximal joints (shoulders, hips, and joints of the spinal column) and it is probably due, as will afterwards appear, to irritating toxins within the cortical neurons. In agitated melancholia it occurs mostly at the small peripheral joints and is probably due to irritating toxins circulating in the nutritive fluids which bathe the cortical neurons. Similar pressure of activity occurs in some cases of subacute alcoholism.

Disorders of Instinct.

It was pointed out in the first part of this manual that instinctive action is closely allied to, in fact the same thing as emotional reaction. The considerations of the last chapter

* For the present I use the word ' volitional ' in this connection ; but it must be understood that the study of cases leads me to suppose that the physical basis of this activity lies mostly in the middle level of the volitional motor system (Rolandic area), not in the prefrontal lobes.

therefore pave the way for the study of the disorders of instinct. These are excess and defect; and there are certain other disorders, which may be called 'erroneous instincts'.

The instincts are increased in the early stages of general paralysis, alcoholic insanity, epileptic insanity and cerebral arteriopathy; and they are diminished in confusional and stuporose states, secondary dementia, myxœdema and cretinism. They are also diminished in melancholia.

Exaltation of the instincts occurs most typically in general paralysis, the disease in which the primitive motor system becomes dominant on account of degeneration of the pyramidal tracts. The eating instinct is increased from the first, and the patient gourmandizes, not because he is hungry but because he is greedy. An increased sexual instinct often gets him into trouble with the police authorities in the early stages of his disease. The instinct of acquisitiveness shows itself in kleptomania and the tendency to buy hundreds of superfluous and unnecessary articles. In the terminal stages of the disease some of the infantile instincts again become dominant: the patient instinctively clasps objects placed in his hand and carries them to his mouth, and perhaps the very last movement to disappear is reflex sucking when an object is placed in contact with his lips.

An increase of instinctive movements is also to be noted in the epileptic and alcoholic insanities, but usually to a smaller degree than in general paralysis. Of such a nature are the brawling, screaming and aimless activity of alcoholic mania and intoxication. The same symptoms are to be observed in some states of maniacal excitement, not perhaps with the same uniformity, but there is the tendency to collect, the exaltation of the sexual instinct and of the instinct to eat something, not necessarily food, for excited patients, especially those suffering from katatoniac excitement, are often quite pleased to eat earth or the grass of the field.

An increase of instinctive activity arises from lack of inhibition in psychasthenic states. In these, actions may arise as the result of imperative ideas. For example, a patient has a feeling that his hands are dirty; he looks at them and sees that they are perfectly clean, but this has no inhibitory action on the original feeling that they are dirty and he feels compelled to go and wash them. A fruitless struggle against such an absurd com-

pulsion goes on in the patient's mind and he has no peace until his hands are washed. Such mental states are known as obsessions.

The morbid impulses are clearly allied to such states as the above; we have already seen that all impulses are instinctive. An irresistible impulse to act in a certain way occurs to a patient and the act is performed without reflection, and often without resistance. The patient recognizes his own lack of inhibitory power and may ask others to prevent him from carrying out the act.

Deficiency of instinctive action occurs most typically in melancholiacs. These patients not only lose the primitive instinct of self-preservation; they even develop the idea of self-destruction, they refuse food, the instinct of sociability disappear and the sexual instinct is so far lost that melancholiacs not infrequently believe they are impotent.

In dementia, including that of general paralysis, instinctive action is diminished. The instincts of locomotion and of vocalization are lost. Advanced dements do not play games and they have no ambitions. The instinct of acquisitiveness which has probably, in the earlier stages of their disease, been strikingly demonstrated by a tendency to collect rubblish, has now entirely disappeared. At meal-times they have to be led to the table and, when there, the attendants frequently have to see to it that they eat the food which is placed before them.

Many remarkable disturbances of instinctive action, **erroneous instincts,** occur in dementia præcox, especially in the katatoniac variety. **Negativism,** for example, is a fairly constant symptom of katatoniac stupor: it may also occur in states of exhaustion. It is a curious condition, in which any suggestion made to the patient at once arouses the counter-suggestion. If a katatoniac be told to step forward, he steps backward; if he be asked to show his tongue, he compresses his lips; if he be told to go to the dinner-table, he walks away from it. This symptom must not be taken for perverseness: the patient cannot help it; it is instinct gone astray.

Stereotypy is a symptom seen mostly in katatonia, but also in exhaustion states. This is a condition in which the patient constantly repeats the same movements for long periods together; he will repeat to-and-fro or rotatory movements with his arms; he may walk up and down the same patch of ground for

hours together, or in circles or figures of eight. The so-called **mannerisms** of dementia præcox are closely allied to stereotypy : one patient will keep an arm stiff, another will always hold his legs straight when in the act of sitting down or rising from a seat, another will drop on all-fours several times a day. These patients are quite unable to give any reason for these antics ; they are merely instincts gone astray.

Automatic obedience is another symptom seen mostly in dementia præcox, but also occasionally in some states of confusion. A patient showing this symptom will, if touched under the chin, raise his head and keep it raised for a minute or so ; if touched on the top of the head, he will flex his neck once more ; if gently pushed from behind, he will take several steps forward, and so on. A special form of automatic obedience is **echopraxia**. A patient showing this symptom will perform any antic which another person takes the trouble to perform in front of him : if you raise your arm, he will raise his ; if you protrude your tongue, he will protrude his ; if you jump, so will he.

By constant repetition many of the above instinctive acts of the insane become, in the course of time, automatic. Kleptomania, masturbation, wet and dirty habits, touching objects (*folie de toucher*), the antics of the katatoniac and even the tearing of clothes may all become habitual. In a few patients (usually hypochondriacal melancholiacs) even the refusal of food degenerates into a habit. I have known several patients who, rather than take food in the usual way, would, three times a day regularly for months, at the bidding of a doctor, pass an œsophageal tube on themselves and pour down a feed of milk and eggs or broth.

Disorders of Speech.

These occur in conformity with the disorders of action in other departments. In stupor, melancholia, dementia, fatigue etc., in which there is paralysis of voluntary action, there is paralysis of speech and the patient is silent or nearly so. In the motor excitement of mania there is noisiness and garrulity. Corresponding to stereotypy we have **verbigeration** in which the patient repeats the same sentence hundreds of times in the course of a day. Mannerism of speech shows

itself in stilted modes of expression. Corresponding to echopraxia we have **echolalia** in which the patient repeats everything that is said to him, with or without change of pronoun. For example, the doctor asks ' How are you to-day ?' and the patient replies ' How am I to-day ?'

And corresponding to the antics we have in the domain of speech a symptom for which I propose the name **pseudolalia.**

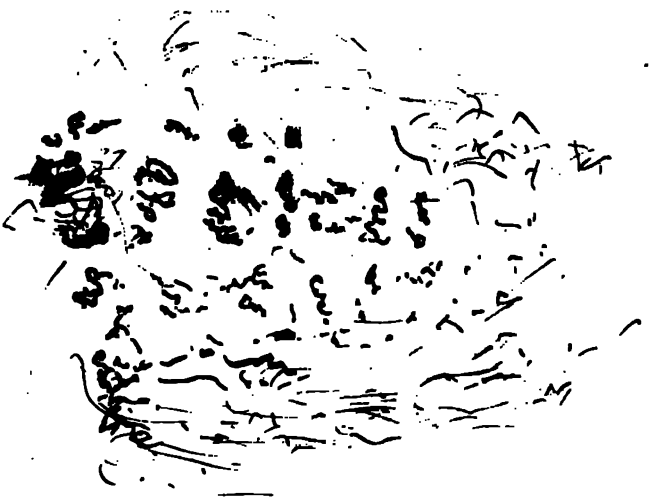


FIG. 22.—APRAXIC PSEUDOGRAPHIA.

Envelope addressed by an arteriopathic dement to his wife.

Patients presenting this symptom apparently pretend to speak; but in reality they utter a series of meaningless sounds, such as ' Camalaba, dink-a-di-dink, goosey-goosey-wadlum '. The reduplicative tendency of this mode of speech suggests that it is of instinctive origin.

When a patient's speech is of such a nature that another person is unable to follow his line of thought, it is said to be incoherent. **Incoherence** results from two causes: (1) The patient is lacking in voluntary attention, so that any chance

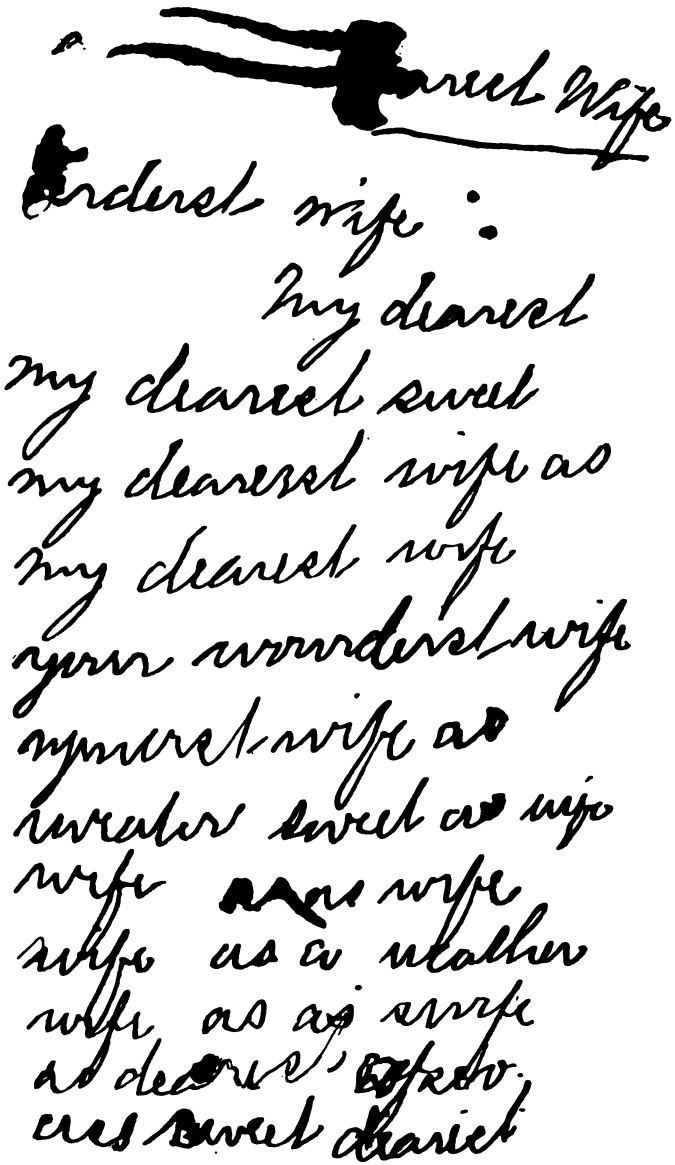
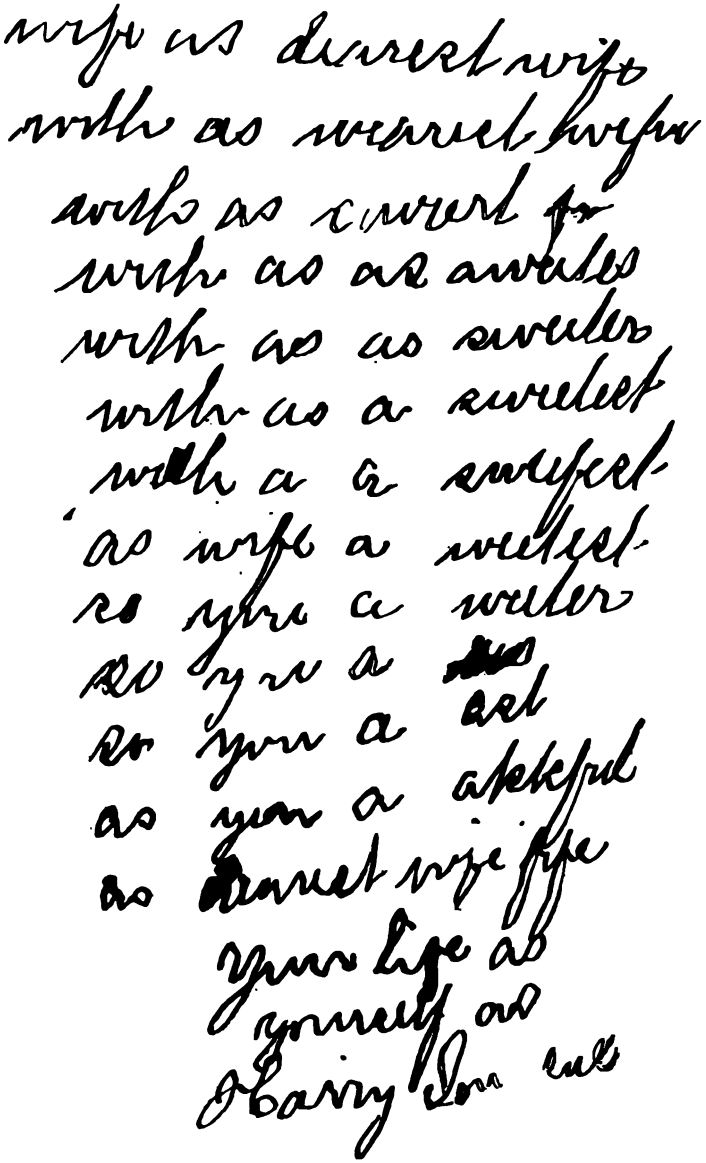


FIG. 23.—APRAXIC IDEATIONAL INERTIA.
Letter by an arteriopathic dement.



percept, such as the striking of a clock or a glimpse of the doctor's tie-pin, by arousing his instinctive attention, diverts the current of his thoughts. (2) The patient's flow of thought is too rapid to allow all the connecting links to be expressed in words ; such a patient is not incoherent to himself.

It will be observed that incoherence is not necessarily a sign of insanity. If you stand by a person talking through a telephone, he is probably incoherent to you because the connecting links of the conversation are missing ; but he is not therefore to be regarded as insane.

The writing of the insane is disordered in exactly the same way as their speech. Just as we have patients with garrulity and logorrhœa, so we have other patients of the same kind who, day after day, write many sheets of foolscap (graphorrhœa).

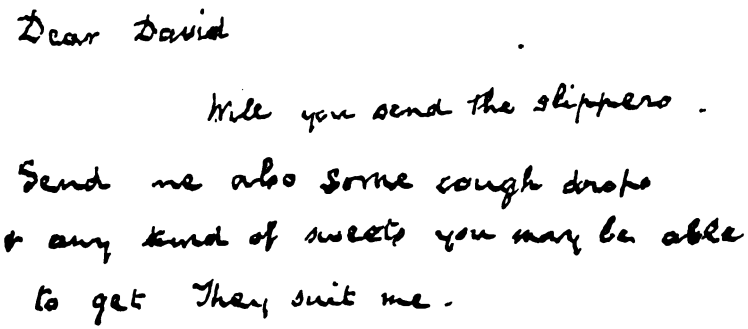


FIG. 68.—SENILE WRITING (*cf.* p. 270).

Patients suffering from stupor, severe melancholia, advanced dementia or advanced general paralysis do not write at all. Incoherence occurs in the writing of the insane, as it does in their speech, and for similar reasons. Katatoniacs perform all sorts of tricks with their writing, just as they do in other departments of voluntary action. Their style is apt to be stilted and circumlocutory. They form their letters with unnecessary care or perhaps have some fantastic alphabet of their own (**pseudographia**). Pseudographia may also occur as a form of apraxia (Fig. 22). Ideational inertia may also be occasionally detected in the writing of an apraxic patient (Fig. 23).

The writing of the general paralytic is characterized by the omission or repetition of letters, syllables and words. This symptom probably depends on some functional disturbance of the visual-perception centre, since similar mistakes are to be

observed when the patient reads aloud; he omits some words and inserts others which are not to be seen on the page before him.

Writing is a recently acquired attainment in the history of the human race and individual, and is therefore one of the earliest attainments to become disordered in all acute dissolutions of the nervous system. Accordingly, we find that one of the earliest symptoms of an acute attack of insanity is deterioration of the patient's calligraphy and of the art of expressing himself in writing.

Reaction-Time.—Many investigations have been made upon the reaction-times of patients suffering from mental disease, and it has been found that their reaction-time for all mental processes is invariably longer than natural. The greatest respect is due to those who have carried out these laborious investigations, but their results must be regarded as valueless. Everybody who has worked in a psychological laboratory knows that it takes months of practice to become a competent subject for psychological experiment; and it is for this reason that the results obtained from patients, who have little or no such previous experience, must all be discounted, apart from the fact that the reaction experiment *per se* throws no light upon mental processes.

Disorders of Attention.

Since attention is a special form of action, our study of disordered action has prepared the way for the study of disordered attention.

Inasmuch as a strong will is the essential characteristic of a strong and stable personality, excessive voluntary action in a strict sense can never be a symptom of mental disorder; and therefore there can never be such a condition as excess of voluntary attention. If, on the other hand, it is contended that such a condition may occur, it cannot be a symptom of mental disorder.

Defect of voluntary attention occurs in exactly the same conditions as defect of volition in general. These are, as we have already seen, states of exhaustion, melancholia and all forms of stupor, imbecility, and gross lesions of the cerebral cortex in the neighbourhood of the motor areas. Defect of voluntary attention is noticeable from the first and is steadily progressive

in such diseases as general paralysis, cerebral arteriopathy and other forms of dementia.

Just as we found, in the previous section, that deterioration of volition is accompanied in most cases by exaltation of instinct; so we find that defect of voluntary attention is, in the first instance and in most cases, accompanied by **exaltation of instinctive attention.** In states of excitement occurring in the infection and exhaustion psychoses the patients are incapable of voluntary sustained attention to the doctor's remarks, but the clink of his keys or a glimpse of his watch-chain suffices momentarily to arouse instinctive attention. One of the chief difficulties in educating an imbecile is his incapacity for sustained voluntary attention; his attention must be aroused instinctively and the possibility of chance percepts reduced to a minimum, for even a fly crawling across the window-pane suffices to divert the current of his thoughts, by claiming his instinctive attention. Instinctive attention is excessive in the earlier stages of all mental disorders in which voluntary attention is deficient, with the exception of melancholia and some forms of stupor.

The importance of 'interest' in determining which percepts and ideas will stimulate instinctive attention is well illustrated in patients suffering from delusions. Delusions are usually of such a nature that the object of delusion invariably claims the patient's instinctive attention. This state of affairs is seen in a characteristic form in the condition known as paranoia, in which the patient's whole attention is devoted to some particular fad.

Diminution of instinctive attention occurs in melancholia and in all forms of advanced dementia and stupor. These include anergic stupor, katatoniac stupor and the stupor associated with some states of exhaustion.

Reflex attention appears to be increased in some patients and diminished in others; but it has not yet been ascertained with which mental disorders the increase and diminution are respectively associated. Investigation of the matter will be of the greatest interest; it will show, *inter alia*, which mental disorders are associated with functional disease of the spinal cord.

CHAPTER VI.

ERRONEOUS JUDGMENTS (DELUSIONS).

FROM a medical point of view the delusions of the insane are of little practical value; from a legal point of view they are all-important. Many abnormal states of depression and excitement do not appeal to the legal mind as states of insanity; but if it can be shown that a patient suffers from an absurd delusion, a court of law is readily convinced of his insanity.

Delusions are not necessarily a sign of insanity. We all have our delusions but we are not all insane. Some people believe that thirteen is an unlucky number, others believe that this is not so. One of these two classes of people is suffering from a delusion; but, whichever class this is, they are not insane. Similarly the natives of Central Africa hold many judgments as true which are regarded by civilized people as delusions, but these Africans are not therefore to be regarded as insane. Children are not insane when they believe that their dolls are hungry or suffer from an illness, but such ideas in an adult would amount to insanity.

It thus becomes necessary to make a distinction between sane and insane delusions. An insane delusion is usually defined as *a judgment which cannot be accepted by people of the same class, education, race and period of life as the person who expresses it.*

It has been objected that, according to this definition, every man who has some new and great truth to communicate to the world is to be regarded as insane. This is not the case, however; for every such man has achieved his particular discovery by prolonged study of the special branch to which it belongs. In other words, he is of vastly superior education, in that particular branch, to the rest of mankind. When Darwin promulgated his doctrine of the descent of man he was regarded

as little short of insane by the proletariat ; but those biologists who had more nearly approached his standard of education and were therefore most competent to judge were the first to accept his conclusions.

It would serve no useful purpose to give a complete list of all the delusions that have been encountered among the insane, even if it were possible to make such a compilation ; but the student will gain some idea of the commonest delusions from the following list :

A patient may believe

That something dreadful is going to happen to himself or his relatives.
That he is going to be hanged or burnt.
That nobody cares any more for him.
That he is deserted by God and eternally damned.
That he has committed ' the unpardonable sin.'
That he has committed a great crime.
That he will lose all control of himself.
That he has a hole in his head or in his back.
That his brain has gone.
That his throat is blocked up.
That his bowels are obstructed.
That his legs are paralysed or made of glass.
That he is made of wood.
That he is an animal—a sheep, a wolf or a bird.
That he is only a few inches high and weighs but a few ounces.
That he is miles high and weighs tons.
That he is God or Christ.
That he is the rightful heir to the throne.
That he is the King or the Emperor of China.
That he is engaged to a great lady.
That he is a millionaire or that he is ruined.
That he is persecuted by means of electricity, hypnotism or ' sorcerism '.
That there is a systematized conspiracy against him, extending over the whole of the civilized world.
That he is unworthy to live.
That he will never die.
That he is dead.

That he has ' cataracts ' in his head.
That the asylum is a Jesuit establishment.
That the other patients are of the opposite sex.
That he is a musician or poet.
That he can raise the dead.
That he is the strongest man in the world.

However absurd such delusions may be, no amount of argument will serve to convince the sufferer of their unreasonableness. The old proverb that—

> ' A man convinced against his will
> Is of the same opinion still,'

is more true of the insane than of any other class of the community.

Although the delusions of the insane are of little diagnostic value, it is always a matter of interest to determine how a patient has arrived at his particular delusion ; and the physician who makes a point of ascertaining this as often as possible will find that he gains thereby a clearer insight into his cases and a more powerful grasp of the subject of insanity in general. Further, the physician should take pains to ascertain all the delusions from which his patient is suffering, in order to avoid hurting his feelings by chance remarks having apparent reference to his fancies.

The causes of a delusion are of two kinds, predisposing and exciting. The predisposing cause is the patient's mood. If he is in a state of depression and misery, he is prepared to believe that he is to undergo the most horrible and excruciating tortures that can be devised. If a poor man is in a state of happiness, joy and elation never before experienced, he is ready to believe that he is a person of influence and importance and that he is possessed of untold wealth : ' the wish is father to the thought '. If a person is in a constant state of suspicion, he sees hidden meanings in commonplace incidents and is prepared to believe that everyone is against him and is persecuting him.

In many cases it is impossible to discover any other than this emotional predisposing cause of delusion, but exciting causes are also at work in the majority of cases. Of these the most frequent are hallucinations. This will be readily understood, for if a person is not to believe the evidence of his senses, what is he to believe ? If he hears voices over his head, what more natural

conclusion than that there are people in the room above? If God appears to him in the heavens, it is not very unreasonable for him to conclude that he is 'the elect of God'. And if his food tastes bitter, it is fairly reasonable for him to believe that it has been drugged.

Many patients arrive at an erroneous judgment by exaggerating the ordinary symptoms of their disease. Melancholiacs always suffer from severe constipation and many conclude from this symptom that their bowels are permanently obstructed, especially if they have the 'epigastric sensation' at the same time. The chief physical basis of melancholia is a slight double hemiplegia of functional origin; hence many patients develop the notion that their legs are permanently paralysed. As we have already seen, melancholiacs lose the function of emotional reaction as well as the power of voluntary movement (popularly known as 'the will'); hence they conclude that they have lost their soul and are deserted by God, that they must have committed the unpardonable sin and that they are eternally damned.

Memory defects are responsible for a certain number of delusions, especially erroneous ideas of time and place. The following case is probably an example of a delusion taking its origin in a temporary lapse of memory. A gentleman was returning from Paris to London. Shortly before he arrived at Calais he fell into an epileptic state (so-called masked epilepsy), but continued his journey. When half-way across the Channel, he jumped overboard. The only person who saw him do so was a middle-aged lady, who straightway had an attack of 'hysterics' and did not tell the crew what she had seen until it was too late. The patient was a strong swimmer, was picked up by another boat and ultimately taken to Chartham Asylum. Now he has no memory of this remarkable experience, nor does he remember leaving France; consequently he believes that he is still on the Continent and that the various institutions in which he has been lodged since his return to these shores are English kidnapping establishments in the middle of France.

The normal tendency to the 'unity of ideation' plays an important rôle in the origin of delusions, as may be shown by the following examples: A patient was looking down the trap of a drain in the garden when he heard a voice (in hallucination); he thought that the voice proceeded from the drain and therefore that there was somebody down there. Another patient,

while in the garden, was watching the movements of a blackbird a few yards from him, when he heard in hallucination the remark 'You d——d fool!' He concluded that it was the bird that had insulted him. A patient suffering from the epigastric sensation had hallucinations of hearing; the conclusion was that the voice proceeded from his abdomen and that he had a devil in his inside. A woman was in the habit of seeing faces in the fire. One day, just after she had seen the outline of her husband's face in this way, she was taking meat out of the oven when she heard his voice in hallucination. Her conclusion was that the meat was human flesh and that she had cooked her husband.

From these considerations it will be seen that the erroneous judgments of the insane are not as illogical as they appear at first sight. That their reasoning is not in accord with the strict laws of logic is obvious; but there would be no advantage in classifying delusions according to the nature of the particular logical fallacies of which the patient had been guilty.

As with the man in the street, there is no logical fallacy of which the insane may not be guilty at times; but there is one fallacy which is essential to a patient suffering from a delusion, viz., the *ignoratio vel ignorantia elenchi*, ignorance of the main question. The main question with patients suffering from delusions is that they are insane. If they were to realize that they are suffering from delusion, the delusion would of necessity cease to exist. By far the majority of the insane fail to recognize that they are suffering from mental disorder, but a few have a certain amount of 'insight' into their condition.

Insight.

It is rare for a patient to have any insight into his own mental condition at the onset of a first attack of insanity; but a large number of patients are capable of appreciating the nature of their malady when it is explained to them or when they find themselves placed under care in an institution for the insane. Such patients are said to have 'insight'.

We have just seen that all who suffer from insane delusions lack insight; and from the investigation of patients we find that the converse usually holds good, that those patients who lack insight almost invariably suffer from an insane delusion, and that those who have insight do not. Accordingly we find insight most

characteristically in cases of intermittent and periodic insanity, other states associated with depression, obsessional insanity, impulsive insanity, neurasthenia, acute and chronic intoxications and some of the milder forms of imbecility, provided always that the patient has no delusions and that the mental disturbance is not so severe as to prevent his thinking at all about the matter.

Insight is characteristically absent in all forms of stupor and confusion, secondary dementia, epileptic insanity, general paralysis, fever delirium, collapse delirium and the severer forms of idiocy; but it will always be found that the amount of insight depends upon (*a*) the patient's capability of coherent thought and (*b*) the presence or absence of delusion.

Disorders of Sentiment.

Inasmuch as sentiment is one of the latest acquirements of the human race, it is not to be wondered at that it is very easily and frequently disordered, both in the sane and in the insane.

Since a sentiment is the voluntary formation of a judgment as to the presence or absence of truth in a statement, beauty in an object or morality in an action, it follows that sentiment is deficient in all those conditions where volition is deficient, where the volitional system is more or less in abeyance, either from functional disorder such as melancholia and stupor or from organic degeneration of the pyramidal system as in general paralysis.

Max Nordau regards some of the works of Rossetti, Burne-Jones, Wagner, Swinburne, Tolstoi, Ibsen, Gautier, Zola and many others, as productions sufficiently anti-æsthetic to justify him in stigmatizing these great men as degenerates. There are not many who agree with him and even Max Nordau himself stops short of suggesting that such men should have been placed under treatment for mental disorder.

I have never heard of a patient being confined in an asylum merely because his artistic productions betrayed a lack of æsthetic sentiment and seldom of an inveterate liar being confined on account of his deficiency of intellectual sentiment; but if a patient's conduct is immoral and therefore antisocial, the law may demand that he be placed under restraint. If he be regarded

by the law as irresponsible for his immoral actions, the restraint is in an asylum for the insane ; if responsible, in gaol.

Let us then make special application of the above principle to disorder of the moral sentiment. Morality has been defined as the foregoing of immediate pleasure for the purpose of gaining enhanced benefits in the future. In other words, morality is the voluntary suppression, for the purpose of future gain (or for the avoidance of future pain), of some tendency to immediate instinctive action. Immorality then is the letting loose of instinctive action owing to defective volition. Immoral acts are therefore liable to occur in all progressive degenerations of the nervous system, because the more recently evolved volitional motor system (the pyramidal tract) suffers dissolution at an earlier date than the instinctive (cortico-rubral) motor system.

Accordingly we find immoral acts occurring in early general paralysis, chronic alcoholism, epilepsy, acute alcoholic intoxication, in the earlier stages of cerebral arteriopathy and in other forms of dementia. We often read of a highly respectable citizen, previously of unimpeachable character, being sentenced to a term of hard labour at the age of sixty-five for some act of immorality. His arteries are degenerate, his volitional nervous system begins to fail him and his instinctive nervous system is uncontrolled. The saddest thing of all is that no amount of expert evidence will convince the judge that this is a consequence of the arterial degeneration of old age.

In idiots and imbeciles voluntary control is never completely developed ; if their pyramidal system develops, it is a weakly functioning apparatus. In some cases (moral imbeciles) immorality is almost the only symptom of mental disorder. Probably the difference between these patients and habitual criminals is only one of degree.

Sentiment is deficient in all states associated with anæsthesia and imperception for the same reason that emotional reaction is diminished in such conditions (see p. 129). It is accordingly deficient in organic disease of the ideational areas, in cases of confusion and stupor, in secondary dementia, senility, myxœdema, cretinism and idiocy.

On the other hand, patients suffering from acute mania and paranoia are always ready to pass judgment upon the sayings and doings of others, as every medical officer of an asylum well

knows; he hears many home-truths during the course of his morning round.

In many cases of obsessional insanity (*folie de doute*) there is marked exaggeration of sentiment. Such patients have to be reassured again and again that such and such a statement is true or false, as the case may be, or that they themselves have made their meaning clear and not made some false statement. They have to be constantly reassured that they have not 'done the wrong thing'; and whether an object is beautiful or ugly may be to them a positive source of worry.

It will be observed that all these cases of exaggerated sentiment are associated on the one hand with hypersensitiveness or on the other with motor excitement.

I have already hinted, in the section dealing with erroneous judgments, that a patient's belief in them is often of the rational variety. Nevertheless, instinctive belief plays an important rôle in a patient's conviction of the truth of his delusions. The question whether belief in an erroneous judgment, ushered in by an hallucination of hearing, is 'belief by suggestion' or not, is too complex a subject to allow of discussion in an elementary text-book.

Changed Personalities.

When we attempt to form a concept of the personality of an individual suffering from an attack of mental disorder, a concept of his 'ego', there is no doubt in our own minds that the very fact of his being insane changes that personality. Much more must we suppose that, from the point of view of the patient, there is a vast change in his personality, were it possible for him to examine it.

We occasionally become acquainted with cases in which the personality is so far changed that the patient becomes an entirely different individual. His very identity is changed, as also his ordinary habits and instincts, his voice and manner of speech; even his calligraphy becomes that of another person. He does not answer to his own name, this too having altered; and if he be questioned about the person bearing that name, either he never knew such a person or his knowledge of him and his habits is of the foggiest nature. Some such patients pass through three or more different identities; indeed a short time ago an account appeared in the

Journal of Mental Science of a patient who had as many as eleven personalities at different times. Most of these cases are referred, rightly or wrongly, to epilepsy.

Of their true nature we are bound to confess our complete ignorance; and this is not surprising when we reflect that we know so little of the normal 'ego'. The 'ego' is the most intangible thing with which our science has to deal.

Sex and Station.

Nobody can go round an asylum without being struck by the difference between the insanity of men and women. The greater tendency of women to motor reaction is strikingly demonstrated both in excited and depressive states. Maniacal women are more noisy, more excitable and give much more trouble than maniacal men; and the motor symptoms of melancholia are always more easily observed on the female than on the male side; the women are more liable to be stuporose and, when agitation occurs, more agitated.

In accordance with the greater tendency of women to fatigue, we find that the insanity of exhaustion occurs more frequently in them; but it must not be forgotten that they are especially liable to such physiological processes as childbirth and menstruation, which are apt to lead to exhaustion and may be unduly prolonged or associated with profuse hæmorrhage.

The anæsthesia which I have described as being especially associated with mental disorder is more frequently found and is usually more extensive in women than in men.

There is also an interesting sexual difference in the nature of delusions. Egoistic man develops the delusion that his bowels are obstructed, that he is dead, that he is going to prison or that there is a huge conspiracy against him. An unmarried woman is apt to develop similar delusions. But the altruistic married woman's care is all for her husband and children. She hears her children's cries as they are being burned or otherwise tortured, she fears that she has injured others, that she has not been a good wife and mother or that she may never again be able to tend her husband and children. This sexual difference also accounts for the greater frequency of paranoia in men.

Insanity occurs rather more frequently in men than in

women. This is especially the case with general paralysis for reasons which will subsequently be considered.

At the present time there are no statistics of the relative frequency of insanity in the lower and the educated classes, because it is difficult to ascertain the proportion which the educated classes bear to the general population. A visit, however, to a number of county and private asylums leaves no doubt in the mind of the most casual observer that the motor reaction of county patients is greater than that of private patients. The excited patients of the former class are more garrulous and noisy than those of the latter. This, of course, does not betoken a difference in the character of the mental disorder of the two classes; the lower classes are naturally more garrulous and noisy than the educated. But this characteristic restlessness of insane patients of the lower classes is especially liable to lead to fatigue and exhaustion and thus to prejudice their chances of recovery.

The Comprehensiveness of Mental Disorder.

At the end of the section on normal mentation it was stated that the various faculties of mind are interdependent. It follows as a corollary that no faculty of mind can be disordered without the others being also affected, at least to a slight extent.

For example, a person suffering from disorder of perception cannot be regarded as fully capable of *reasoning* about objects of perception in his environment. Further, disorder of perception is liable to affect the *conduct* in some measure. Again, take the case of a patient suffering from some insane delusion. This is bound to affect his *conduct* in many ways and it is a matter of experience that such a delusion tends to colour the patient's *memory* of incidents which occurred long before the delusion existed. Loss of memory *per se* warps a patient's *judgment* concerning things forgotten, and even concerning things associated with things forgotten.

We cannot regard any 'part' of mind as being affected alone. Mind is not a 'thing' to be divided into 'parts': mentation is a process dependent on the functioning of the whole cortex cerebri and any disorder of this function interferes with the process of mentation as a whole.

Nevertheless, we are bound to admit that disorder of a given mental faculty in one direction does not necessarily imply disorder of that faculty in all directions. A man may be incapable of recognizing some objects but quite capable of recognizing others ; he may be able to remember incidents of one kind but not those of another ; and his conduct may be quite abnormal in some situations but perfectly normal in all others. In like manner, a patient's judgment may be warped in one direction only. It does not follow that, because he is suffering from some insane delusion, his judgment on all other matters is erroneous. He may believe that he is the prophet Jeremiah and yet be quite capable of transacting an important piece of business ; he may believe that the earth has gone out of its course and yet make a reasonable will or he may believe that he is the victim of world-wide conspiracies but at the same time be capable of solving the most abstruse mathematical problems.

PART III.

MENTAL DISEASES.

CHAPTER I.

THE CAUSATION OF INSANITY.

FROM our studies of normal psychology we have learned that the physical basis of mentation lies in the nervous system; and from our studies of psychology of the insane, that abnormal mentation is dependent upon the abnormal functioning of various parts of the nervous system. This abnormal functioning is dependent upon two classes of conditions: one is congenital instability or inefficiency of the nervous system, rendering it incapable of withstanding the ordinary stresses of life or of carrying on its functions to the end of life; the other is damage inflicted upon the nervous system by the toxic products of disease, by the excessive use of alcohol and other drugs, by physical or mental shocks, or by the encroachment of neuroglial overgrowth or of tumours. If the nervous system is a good one, it can withstand most of these evils and continue its work in a satisfactory manner in spite of them. A good nervous system takes a greater amount of alcohol to upset it than a bad one, and a bad one will wear out (suffer from senility) earlier than a good one. In the case of some geniuses the nervous system is of an exceedingly fine and delicate nature, incapable of withstanding the ordinary stresses of life, just as a fine piece of mechanism is more likely to get out of order than a coarser instrument of the same nature.

When, in any given case of insanity, the nervous system is recognized to be congenitally unstable or inefficient, the cause of insanity is said to be *endogenous;* and when the nervous system breaks down as the result of physical or mental shocks,

poisons or excessive strain, the cause is said to be *exogenous*. Clinical experience teaches that most cases of insanity result from an interaction between these two sets of causes and that a strong nervous system requires a more severe strain to derange it than a weak one. A sound nervous system may break down as a result of financial ruin, consequent starvation and physical illness; but an unstable nervous system may break down on account of normal uncomplicated childbirth.

The most important endogenous cause of insanity is *heredity*, which accounts for more than 50 per cent. of the cases.

With a view to determining the importance of heredity as an etiological factor of insanity, Otto Diem of Herisau compared the parentage of 370 sane and 370 insane people, with the following results:

	Parents of 370 Sane.	*Parents of 370 Insane.*
Insanity	17	68
Alcoholism	32	63
Senile dementia	1	10
Eccentricity	22	67
Suicide	2	4
Total abnormal	74	212
Total normal	666	528
Total of all parents	740	740

Hereditary influence is said to be *direct* when the father or mother of the patient has suffered from mental disease. There is a German hypothesis, which receives support from Orchansky's statistics, that the constituent elements of the ectoderm are derived from the father; and since the nervous system is of ectodermic origin, it is supposed that paternal hereditary influence is much stronger than maternal. Statistics show that this is especially the case with regard to sons.

Heredity is said to be *collateral* when mental disease occurs only among the brothers, sisters, uncles, aunts or cousins of the patient.

When any of the grandparents or more remote ancestors, but not the parents of the patient, have been mentally afflicted, the hereditary influence is said to be *atavistic*. How many generations are necessary to exhaust the influence of atavistic heredity

is an unsolved problem. Lombroso and Lacassaigne go so far as to suggest that the brutality of certain criminals is atavistic, dating from their ancestry in the wilds of the forest.

There is an ill-founded popular notion that the children of parents related to one another show a special predisposition to insanity. If a neuropathic tendency has already shown itself in the ancestry of such parents, their union in wedlock renders the evil hereditary influence cumulative; but if those parents come of a healthy stock, their offspring will not only be free from any tendency to disease, but they will have the advantage of cumulative tendencies to health.

The various members of some neuropathic families tend to develop the same type of nervous disease; in these cases, the hereditary influence is said to be *similar* and the family characteristic may prove helpful in framing a diagnosis and prognosis. In other cases the family shows a general neuropathic tendency to develop heterogeneous affections of the nervous system bearing little resemblance to the diseases of the ancestors; the hereditary influence is then said to be *dissimilar*. Some patients not only develop the family disease but do so at the same age as other affected members of the family. More commonly, however, we find that nervous disease tends to appear at an earlier age in the children than in the parents.

From observation of my own patients I am inclined to the opinion that the proportion of cases of similar heredity is in excess of its probability and that the distinction between similar and dissimilar heredity is therefore justifiable.

Insanity may also be consequent upon (*a*) illegitimacy and (*b*) illness of the parents at the time of conception. Factors depending on the illegitimacy of the offspring are mental anxiety of the mother and the consequent intra-uterine malnutrition of the child, which may also be due to displacement of the placenta by ineffectual attempts at abortion. Illness, especially drunkenness, of the parents during conception has a deleterious effect on the germ-plasm; it has been noted on the Continent that drunkenness at that time has a special tendency to produce hydrocephalic idiocy in the offspring.

From the accompanying tables, taken from the Commissioners' Report for 1903, and from the chart which I have constructed from Table III., many lessons may be learned with

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3,996,4

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3
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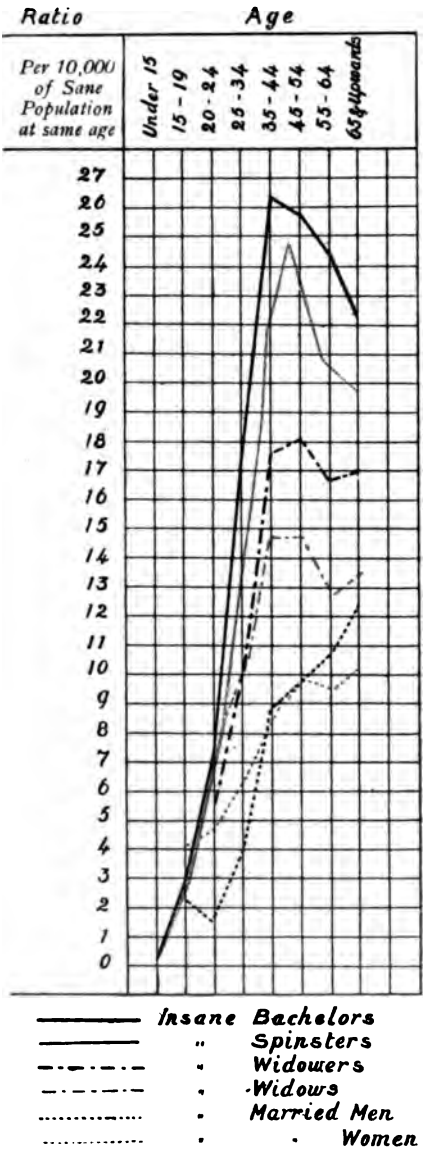

FIG. 25.—INCIDENCE OF INSANITY IN RELATION TO MARRIAGE.

To face p. 159.

regard to the relationship of age, sex and civil state to the incidence of insanity.

It will be seen that insanity is at least twice as common in the single as in the married. That this fact is not due to any avoidance of marriage on the part of the neuropaths is shown by the frequency of mental disease among the widowed; insanity appears to be directly caused by the evil influence of a single life.

The curve for the married men shows little more than an increasing tendency to insanity as age advances; there is a slight rise in the curve at middle life, probably due to the incidence of general paralysis during that period. During the child-bearing period insanity is more common in married women than in married men; and puerperal insanity is probably responsible for the frequency of insanity in young widows. In all other instances, insanity is proportionately more frequent in men than in women.

On the other hand, the female insane population exceeds the male insane population, both absolutely and relatively, 35·77 per 10,000 of the male population being certified as insane, as against 39·12 of the female.* This discrepancy may almost entirely be accounted for by deaths from general paralysis, since 1,100 men die annually in England and Wales of that disease, but only 300 women.

As to the direct cause of the enormous incidence of insanity in middle life among the unmarried, we must suspend judgment until further statistics are forthcoming. At first sight one would suspect general paralysis of being the cause of any large increase between thirty-five and forty-five years of age; but, according to the author's experience, general paralysis occurs much more commonly among the married than the single. Of the last 100 general paralytics admitted to Bethlem Hospital, 26 were single, 70 married and 4 widowed.

Among women from forty-five to fifty-five years of age, single, married and widowed, there is a marked increase in the tendency to insanity, which is in all probability directly dependent upon the menopause.

The *exogenous* causes of insanity are either mental or physical. Worry of various kinds is the most frequently ascribed mental

* Figures based on the insane population of 1906 and the census of 1901.

cause of an attack of insanity; but it is commonly found, on probing the matter, that worry was only the first symptom, not the real cause. Nevertheless, there is not the slightest doubt that the onset of many attacks of insanity is determined by the 'loss of relatives and friends', 'business anxieties and pecuniary difficulties'. Still, it is doubtful whether such causes are as frequent as the Commissioners' statistics represent them to be. In cases which have been ascribed to business worries or pecuniary difficulties we often find on inquiry that the patient's affairs are fairly satisfactory and that the sole cause of the worry is his inability to appreciate his true financial position. When a person becomes depressed he worries over trifles, even imaginary ones.

'Fright and other forms of nervous shock' are said to be responsible for more than one per cent. (according to the Commissioners' statistics) of the admissions to asylums. But here again we must be on our guard and recognize that, of all the people exposed to such influences, a certain number are already on the verge of a nervous breakdown. Cases undoubtedly occur which are directly traceable to such incidents as seeing a friend killed, or waking in the morning to find a bedfellow dead. Anergic stupor and exhaustion psychoses are the most common mental disorders which ensue. Love-affairs, on the other hand, more frequently lead to maniacal excitement; acute delirious mania sometimes occurs in such cases, so that the novelist is right when he makes his jilted heroine die within a few weeks from the excitement of 'brain fever'. These cases supply a severe criticism of the view, which is now being pushed to its utmost limits, that insanity is always due to a toxin circulating in the blood.

A person with an unstable nervous system is liable to an attack of insanity at any time and under any circumstances; and so it has happened that almost every circumstance under the sun has been labelled the cause of insanity. A man's religion, his education, his profession and nationality have all been blamed.

For reasons that have already been discussed, neuropaths have emotional natures; *religion* therefore appeals to them very strongly. But it is erroneous on account of this peculiarity to regard religion as the cause of an attack of insanity. The Jews are particularly liable to insanity; not on account of their

religion, but because the nervous system of the Jew is very frequently unstable. The ritual of Roman Catholicism is exceptionally emotional; but mental disease does not appear to be abnormally frequent in Roman Catholics. On the other hand, it is a bad symptom, of evil prognostic significance, when the first symptom of an attack of insanity is a change from a lower form of religion to Roman Catholicism. Spiritualism appears to be occasionally responsible for an attack of mental disorder. I have met with at least three cases of auditory hallucination, which developed apparently as the result of suggestion at spiritualistic séances.

Of late years an assumed *over-education* has been advanced as a cause of insanity. The idea is obviously erroneous. Everybody is more or less educated; but, so far as I am aware, there are no statistics to show that insanity is unusually prevalent among the educated classes. The authorities at idiot establishments recognize that judicious education has rather a beneficial than a deleterious influence on their patients. A badly-conducted education is of course harmful and children that have been 'spoiled' are apt to find themselves unfitted for the world they have to live in.

Mental disease is especially frequent in those *professions* which entail a large amount of worry; but the worry, not the profession, should in these cases be held responsible for the disorder. It frequently happens that persons of an artistic temperament are of an unstable nervous constitution; consequently artists, musicians and poets are exceptionally liable to insanity. Here again the mental instability must be held responsible: insanity is not caused by the composition of music or poetry, or by the creation of pictures.

The incidence of insanity among the several *nationalities* forms an interesting chapter in the etiology of insanity. It is difficult to make satisfactory comparisons because provision for the insane varies widely in different countries, and the causes of insanity in one country may be non-existent in another. For example, pellagrous insanity, which is caused by eating diseased maize, is a common disorder in Northern Italy; but the condition is practically unknown in this country.

In comparing the different nationalities of the world we find that insanity is essentially a disease of modern *civilization* and that it is most frequent in those countries where civilization

has made the greatest advances. Mental disorder is not unknown among savages; but it is comparatively rare. In almost all the text-books of insanity this effect of civilization is ascribed to hurry and bustle and to the struggle for existence among civilized people, especially among urban communities; for it is the large cities that fill our asylums. Popular lecturers are busy advertising that insanity and other diseases are due to defective sanitation, insufficient sleep, overwork, poverty, the noise of the streets at night, brain-fag and, as we have just seen, education.

Now this is manifestly erroneous. Even its premises are false. How can anybody bring himself to believe that defective sanitation is a cause of the degeneration of civilized communities, when he compares the magnificent systems of sanitation in our great cities with their complete absence among savage races?

Mental disorder can scarcely be said to be common in brain-workers; and it is certainly very rare in children under education. Overwork, too, is somewhat of a myth. It is true that we get through a tremendous amount of work nowadays but that is merely because work is rendered easier by modern scientific instruments and labour-saving appliances. And as regards this fierce struggle for existence, we do not know what it is, compared with the conditions of existence among primitive peoples. Is a savage in debt to his fellows? His goods are confiscated and he is probably killed, perhaps to make a meal for his creditors. Is he sick of a disease? He is carried into the wilds of the forest and left there to die. Is he suicidal? The means are placed at his disposal that he may kill himself withal. Is he subject to attacks of frenzy which render him a source of annoyance to his fellows? They fall upon him and slay him. Thus do the primitive nations free their country of undesirables.

Compare this condition of affairs with that of a civilized community. The bankrupt is allowed to pay his creditors sixpence in the pound; the pauper is luxuriously provided for in hundreds of ways lest he should starve, feel the cold of winter or suffer any other form of discomfort; the sick man is treated with care and skill never before experienced in the history of the world and is restored to his family that he may procreate children with a predisposition to the disease of their father.

Melancholiacs are cared for in asylums, restored to health and sent forth into the world to beget more melancholiacs, instead of being allowed to terminate their disease in Nature's way, suicide.

The pith of the whole matter is this: that among savage peoples the interests of the individual are subordinated to those of the race and natural selection is at work; while among civilized nations the interests of the race are subordinated to those of the individual, natural selection is allowed no play and the result is the *survival of the unfittest.* This is the true cause of the increase of insanity; it lies under our very hands. The medical man is himself responsible for the increase of disease and the degeneration of the race. The physician who specializes in mental diseases is, or should be, a comfort and a blessing to his present patients, but he is a curse to posterity.

War with its attendant stresses and privations is a potent cause of insanity. Insanity was rife among our soldiers during the late South African War and also among the Russian soldiers during the Russo-Japanese War.

There is a popular idea that *association with the insane* is liable to produce mental disorder and the relatives of an insane patient often bring this forward as an argument against asylum treatment. The notion is not supported by facts; the incidence of insanity among attendants on the insane is not exceptionally great. It occasionally happens, however, that two maiden ladies, who have lived together and have had little communication with the outside world for many years, both develop a form of paranoia in which they have the same delusions. This condition has been called *folie à deux* or communicated insanity.

There is no doubt that *alcohol* is a frequent and potent cause of insanity, but it is difficult to obtain statistics on the matter because alcoholism is too frequently regarded as the cause of an attack when in reality a drinking bout has only appeared as the first symptom. Alcohol is one of the causal factors of insanity in 4 to 5 per cent. of the Bethlem cases; but true alcoholic insanity forms only 2 per cent. of the cases.

Mental disorder may further be induced by chronic poisoning by various metals and drugs, and even by diseased maize (pellagra).

Sexual excess is rarely a cause of insanity, although it is fre-

quently ascribed as such. A sexual outburst is liable to occur in the earlier stages of many insanities in which the patient loses voluntary control and instinct dominates his actions; in such cases sexual excess is a symptom, not a cause. The question is often asked: 'What is sexual excess?'. No numerical definition can be given; sexual excess is indulgence in the sexual act with such frequency as to be deleterious to health. When the result is disorder of the nervous system the most common form of disease is, in the author's experience, chronic nervous exhaustion.

Masturbation stands in much the same position. Rarely a cause of insanity, it is rather to be regarded as a symptom. Neuropathic individuals are frequently addicted to the vice on account of their strongly emotional instinctive natures. It is said to be common among some geniuses. Voltaire in his later years confessed to having masturbated all his life. Masturbation is liable to occur in the earlier stages of many forms of insanity, for the same reason which accounts for other sexual outbursts. In some cases of stupor associated with peripheral anæsthesia characteristic of mental disorder, masturbation arises as the direct result of the anæsthesia. Consciousness being dependent upon sensation, in states of peripheral anæsthesia it is dependent upon sensations arising in the sensitive remainder; the patient's attention is thus directed to the genital region and he acquires the habit of masturbation.

Functional disturbances of the brain may occur as the result of *disease of other organs*. Dr. Head has shown that the pain of visceral diseases occasionally gives rise to hallucinations of vision, hearing or smell, or to states of depression or exaltation. Pain in the epigastrium, and therefore indigestion, is especially liable to cause depression, quite independently of the possible absorption of noxious products of disordered digestion: a blister applied to the epigastrium will sometimes cause depression of this nature. Possibly the depression associated with constipation can sometimes be accounted for in this way.

Mickle has studied the mental symptoms associated with the various forms of cardiac and arterial disease. In the earlier stages of aortic regurgitation, depression is the rule; but in the later stages when the heart is failing, the patient is usually excitable and exalted. Aortic stenosis is said to be associated with impulsiveness, violence and delusions of persecution. It is more frequent in general paralysis than in any other forms of

insanity, syphilis being the most important cause of both general paralysis and endarteritis. Mickle states further that mitral regurgitation tends to depression, and degeneration of the cardiac muscle to motor restlessness. These observations are in accord with those of Craig, who found that states of depression are associated with high blood-pressure and states of motor restlessness with low blood-pressure. Motor restlessness frequently appears in the later stages of wasting diseases when the blood-pressure is low.

Similarly depression is the rule in cases of Bright's disease, the blood-pressure being high; but in the last stages of that disease, when the blood-pressure falls, the patient is liable to become restless and excited. Uræmic states in which the nervous system is subjected also to toxic influences are characterized by hallucinations, especially of vision, accompanied by agitation gradually changing to stupor which deepens to coma in the terminal stage.

Diseases of the thyroid are very liable to lead to various forms of insanity, which will subsequently be considered in detail.

Infectious disease and other exhausting conditions may also give rise to characteristic forms of mental disorder.

Insanity is very closely allied to other functional nervous diseases; accordingly we find that it is frequently ushered in by an attack of neurasthenia, chorea or hysteria in some form, while the insanity of epilepsy is responsible for one-sixteenth of the asylum population of this country.

Inasmuch as the cerebral cortex is recognized to be the physical basis of mind, it would naturally be supposed that mental disorder would be a common, if not the usual, result of gross organic lesions of the cortex; but, as a matter of fact, organic insanity is by no means common. When a person becomes hemiplegic as a result of thrombosis of the middle cerebral artery, the mental disorder which results is loss of voluntary action and perhaps excess of emotional reaction on one side of his body; but such mental disorder cannot be characterized as insanity. Of course, a certain number of these patients become certifiably insane and then their insanity is frequently accompanied by symptoms which have been regarded as characteristic of organic disease. The various types of organic insanity will receive consideration in due course.

CHAPTER II.

THE PHYSICAL STIGMATA OF DEGENERATION.

WE have seen that most cases of mental disease are induced by stresses acting upon an unstable nervous system, such stresses as have little or no deleterious influence upon the mentation of a normal individual; and the question arises whether there is any way of recognizing that a given individual runs unusual risk of mental disease from exposure to the ordinary stresses of life. A medical man may, for instance, be consulted as to the possibility of this or that occupation being too strenuous for a certain member of a family when another member is afflicted with mental disease, the person in question never having shown signs of nervous debility.

Under such circumstances the physician has to rely upon the general configuration of the individual and to determine whether his limbs and other parts of his body are well shapen and proportionate to one another. In other words, he looks for the physical stigmata of degeneration. These are of three classes:

1. Anomalies in the shape of the skull, these being dependent upon anomalies in the shape of the brain.

2. Anomalies which show a tendency on the part of the individual to revert to an ancestral type (atavism).

3. Deformities which show evidence of incomplete development.

Cranial Anomalies.—Marked asymmetry of the skull is to be regarded as a stigma of degeneration. Slight asymmetry is unimportant since it frequently occurs in normal individuals, especially in the frontal region.

The normal circumference of the skull is 22½ inches for a person of average size. A deviation of more than 2½ inches in either direction from this standard is to be regarded as abnormal although exceptional individuals have been known whose cranial

circumference measured only 18 inches on the one hand and 37 inches (hydrocephalus) on the other, whose intellectual functions were very slightly, if at all, deficient.

The antero-posterior diameter is normally about $7\frac{3}{4}$ inches, the greatest transverse diameter being normally $6\frac{1}{8}$ inches.

The binauricular diameter (calliper measurement from one auditory meatus to the other) and the length of the face from the root of the nose to the lowest part of the chin should each be about $5\frac{1}{4}$ inches; and the binauricular arc and naso-occipital arc (root of nose to occipital protuberance measured over the highest point of the skull) should each be about 14 inches.

Broadly speaking, an individual is to be regarded as abnormal if his measurements differ more than 15 per cent. from the above and as a degenerate if the measurements are more than 15 per cent. below the normal.

The cephalic index or index of breadth is found by multiplying the breadth by 100 and dividing by the length:

$$\frac{\text{breadth} \times 100.}{\text{length}}$$

From the hats stocked by hatters we may infer that the usual cephalic index in this country is 79. Indices below 77 are said to be dolichocephalic; 77 to 81, mesocephalic; and above 81 brachycephalic. Peterson of New York regards all indices between 70 and 90 as falling within normal limits, but such a view is probably too liberal.

Platycephalus is a condition in which the top of the head is abnormally flat.

Acrocephaly is the dome-shaped skull. It is commonly associated with dolichocephaly and, according to some authorities, with genius.

Atavistic Anomalies. — Man as compared with the lower animals is characterized by great development of the cranium and small development of the jaws so that his face is vertical, whereas the face of the animal is rather horizontal. Accordingly prominence of the jaws with recession of the forehead (prognathism) is an atavism in man, and therefore a stigma of degeneration. The facial angle is the angle, seen in profile, formed by a line drawn from the middle of the supra-orbital line to the margin of the alveolus between the central incisor teeth of the upper jaw, and a line from the latter point to the centre of the auditory meatus. This angle is normally about 78 degrees

in the macerated skull. When the angle is more acute than 75 degrees, the skull is prognathous. It is not very difficult to estimate this angle in the living subject. In any marked case the facial aspect is sufficiently striking for prognathism to be recognized by the unaided eye.

Similarly the lower animals, the proboscis monkey excepted, have a broad flat nose as compared with man; and a broad flat nose in man (except in the black races) is an atavistic stigma of degeneration.

Other recognized facial stigmata are great prominence of the malar bones and marked asymmetry of the face.

Deformities of the Pinna.—These are of frequent occurrence and, if well marked, of considerable importance. Peterson distinguishes twenty-two varieties, as follows:

1. Abnormal implantation: the ears project too far (Fig. 26, *a*) or are placed too high, too low or too far back on the head.
2. Excessively large ears.
3. Excessively small ears.
4. Too markedly conchoidal shape, the antitragus, antihelix, and crura furcata being insufficiently developed; while the helix outlines the ear 'like the rim of a funnel'.
5. Excessive or deficient length, excessive breadth of the upper part or absence of the lobule.
6. A long ear with constrictions in its breadth (Fig. 26, *b*).
7. The Blainville ear: asymmetry, usually due to anomaly of the left ear.
8. Absence of the lobule, commonly associated with other deformities.
9. Adherent lobule inclining downward toward the cheek (Fig. 26, *c* and *d*).
10. Stahl ear No. 1. The helix is too broad and coalesces anteriorly with the inferior crus.
11. The Darwin ear which is characterized by a prominent point of cartilage at the upper and posterior part of the rim —the point of the ear in lower animals (Fig. 26, *f*).
12. The Wildermuth ear, in which the antihelix is more prominent than the helix. This is very common among degenerates (Fig. 26, *d*).
13. Absence of the antihelix and crura furcata (Fig. 26, *a*).
14. Stahl ear No. 2, in which there are three crura instead of two.

a

b

c

d

e

f

g

h

i

FIG. 26.—DEFORMITIES OF THE PINNA.

15. Wildermuth's Aztec ear, in which the crus superius of the antihelix is continuous with the helix anteriorly, and there is no lobule.

16. Stahl ear No. 3. The antihelix and antitragus are joined together by a ridge and the superior crus is wanting (Fig. 26, *i*, approaches to this condition).

17. Reduplication of the helix; overfolding of the helix (Fig. 26, *g* and *h*: a pin is held in position by the overfolded helix in *g*).

18. Too large or too small a concha.

19. The scaphoid fossa is continued into the lobule (Fig. 26, *e*).

20. The Morel ear, in which there is defective formation of the helix, antihelix, scaphoid fossa and crura furcata. It is unfolded, flat and thin at the edges, like a plate, and generally larger than normal (Fig. 26, *f*).

21. Irregular thickenings of the cartilage.

22. Various anomalies such as clefts, accessory auricles, and abnormal hairiness of different parts of the pinna.

Of all these anomalies, probably the least important is the adherent lobule. This occurs in 20 to 30 per cent. of normal people, but it is twice as common among degenerates.

This is a convenient place to mention the so-called 'insane ear' which presents a shrivelled appearance as the result of a previous 'hæmatoma auris', otherwise called 'othæmatoma'. Although this occurs among perfectly normal people as the result of severe injury to the pinna, especially from blows received in the football field, it occurs with abnormal frequency among the insane. It is mostly seen in cases of general paralysis, epilepsy and katatonia. There is usually, but not always, a history of some slight injury to account for the condition, such as holding the patient's head firmly between the hands during the process of artificial feeding.

Hæmatoma auris makes its appearance as a thickening or swelling in the neighbourhood of the antihelix. This swelling gradually increases in size and may spread over the whole surface of the pinna until, after a few days, it looks like a dusky bluish egg on the side of the head. In the course of some months the swelling subsides, leaving the ear deformed and shrivelled.

The recognized treatment of the condition is to blister the skin over the tumour with liquor epispasticus.

If the tumour is incised, it is found to contain normal blood,

separating the perichondrium from the cartilage ; but this should not be done, lest it lead to suppuration.

Ford Robertson has shown that hæmatoma auris is the result of degeneration of the ear cartilage, affecting at first the cartilage cells and then the elastic fibres, which become fluid. In this way small cysts are formed near the surface of the ear cartilage ; the walls of these then become vascularized. The new vessels in turn degenerate, rupture and distend the cysts with blood. The hæmorrhage, increasing gradually, strips the perichondrium from the cartilage and ruptures pre-existing vessels during the process, which continues until the pressure becomes sufficient to arrest

FIG. 27.—HÆMATOMA AURIS.

FIG. 28.—THE SAME EAR TWELVE MONTHS LATER.

further hæmorrhage. The blood then clots, and the serum expressed from the clot becomes absorbed in the course of a few months, during which process the ear shrivels.

Deformities of the Palate.—In a normal person the arch of the hard palate is large and wide with a moderately high vault. Generally speaking, the degenerate palate is too high and narrow. Peterson classifies degenerate palates as follows :

1. Palate with Gothic arch. The centre of the cast of the palate is somewhat pointed. The arch may have either a high or low pitch and it may be short or long.

2. Palate with horseshoe arch, comparable to the arch of Moorish architecture. The alveolus projects into the cavity of the mouth, so that a cast is either impossible or has to be taken in several sections.

FIG. 29.—CASTS OF DEFORMED PALATES. NEGATIVES IN THE UPPER ROW, POSITIVES IN THE LOWER.

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3. The dome-shaped palate.

4. The flat-roofed palate.

5. The hip-roofed palate, in which the antero-posterior arch is too pronounced. Artificial feeding may be extremely difficult in the case of a resistive patient with this form of palate.

6. The asymmetrical palate.

7. The torus palatinus, a bony thickening of variable shape in the neighbourhood of the intermaxillary suture. Peterson regards this anomaly as the least important of these deformities.

From a study of the palates of fifty-six patients at Claybury Asylum, Dr. E. H. Harrison came to the conclusion that the palate indicative of 'insane heredity' is a low, broad palate, which is shallow or of average depth (11½ millimetres) opposite the first bicuspids; while the palate indicative of 'general degeneracy' (from rickets, congenital syphilis, etc.) is characterized by an increased depth opposite the first bicuspids.

Other anomalies of the mouth, which are recognized as stigmata of degeneracy, are too much corrugation of the palate behind the incisor teeth, malpositions and irregularities of the teeth and delayed dentition. An abnormally long tongue is also one of the stigmata; the tongue is nearly always too long and too wide in cases of Mongolian idiocy.

The lower jaw may be abnormally developed and in some idiots has a bony prominence in the middle of the lower border, the 'lemurian apophysis' of Albrecht.

The most important congenital **anomalies of the eyes** in this connection are epicanthus (a fold of skin overlapping the internal canthus, usually symmetrical), irregular or unequal colouring of the irides, coloboma iridis, persistent pupillary membrane, retinitis pigmentosa, and high degrees of myopia and hypermetropia sufficient to cause spasmodic strabismus.

Degenerative Stigmata in the Limbs.—These are asymmetry, fusion of fingers or toes, supernumerary fingers and toes, small thumbs, an unusually large number of fine lines in the palm of the hand, and laxity of the ligaments so that the fingers can be easily bent back to a right angle; an adult Mongol idiot can put his toe into his mouth. I have also observed in cases of idiocy and dementia præcox that the thumb tends to face forward like the fingers, instead of looking across the palm, and that the terminal joint of the thumb does not undergo the normal amount

of internal rotation when it is flexed. These features may also be observed in the thumb of the chimpanzee.

Cutaneous Stigmata.—These are mostly anomalies in the growth of hair, such as glabrous chin in men, abnormal growth of hair

FIG. 30.—SIMIAN THUMB OF A PATIENT SUFFERING FROM DEMENTIA PRÆCOX.

Diminished internal rotation during flexion of the terminal phalanx.

FIG. 31.—NORMAL THUMBS, FLEXED TO SHOW THE INTERNAL ROTATION OF THE TERMINAL PHALANGES.

on the face and breasts of women and along the spinal column in either sex, and a double or eccentric whorl at the vertex of the scalp. Irregular pigmentation of the skin, as in vitiligo and nævi, is also regarded by some as a stigma of degeneracy.

Adenoma sebaceum is a disease found only in a certain form of idiocy. Longitudinal ridging of the nails is said to be indicative of a tendency to neuropathy.

FIG. 32.—SIMIAN HAND OF A PATIENT SUFFERING FROM DEMENTIA PRÆCOX.

The thumb faces forward like the fingers. Note also the shortness of the little finger and the flatness of the thenar and hypothenar eminences.

Many regard as stigmata all **anomalies showing evidence of incomplete development**. These include hare-lip and cleft palate, meningocele and spina bifida, stunted limbs, congenital dislocation of the hip, congenital heart disease, herniæ, hypospadias, epispadias and ectopia vesicæ, imperforate anus, imperforate vagina, uterus bicornis, undescended testicle and hermaphroditism. An unnaturally youthful face surmounting an adult body is a stigma familiar to all.

General Abnormalities.—Giants, dwarfs and persons in whom the relative proportions of the various parts of the body to one another are abnormal, are generally to be looked upon as degenerates.

CHAPTER III.

INTERMITTENT AND PERIODIC INSANITIES

(MANIACAL-DEPRESSIVE INSANITY).

THE proposition that periodicity is a normal characteristic of mental function is so self-evident that it scarcely needs exemplification. The diurnal alternation between sleeping and waking, the weekly day of rest provided for by the Jewish law, the monthly change in a woman's character corresponding to her menstrual period, the annual migration of man to the seaside or elsewhere, which must be arranged for in every house of business, and the alternating fits of energy and of laziness normal to almost every man and woman will at once occur to the reader.

The insane are not exempt from this law of periodicity. Every form of mental disorder is liable to remission, intermission and alternation; but the form of insanity about to be described is especially characterized by remission and intermission or by alternation and periodicity. The subjects are liable to attacks of mania, melancholia or stupor, these being in some cases accompanied with or replaced by some delusional state.

The cases are divisible into two categories:

(*a*) Intermittent insanity and
(*b*) Periodic insanity.

Intermittent insanity, which is by far the commoner of the two varieties and, so far as the isolated attacks are concerned, the most curable form of mental disorder with which we have to deal, accounts for a large percentage of the admissions to asylums.

The mental equilibrium of these patients is very unstable. Their first breakdown occurs usually in the third decade and they are liable to repeated attacks during the rest of their lives. The intervals between the attacks vary in length: they may at

first be of five, ten or twenty years' duration ; but the intervals tend to grow shorter as age advances, until at last the patients have to be taken care of permanently in an asylum. As the attacks get closer together dementia supervenes, each attack leaving the patient more weak-minded.

This form of insanity has been compared by the French school to a spinning top. So long as the top is undisturbed it maintains its vertical position ; but a slight blow on the side sets it swaying, the oscillations being at first comparatively slow but becoming apparently more and more rapid as the sides approach the ground ; finally it falls on its side and rolls away. Its spinning life is done, as is the mental life in the terminal stage of intermittent insanity. But it is not always necessary for the top to receive a blow in order to bring about its final downfall. Left to itself, it will ultimately oscillate and fall to the ground. So it is with all patients of unstable mental equilibrium ; the day must inevitably come, if they live long enough, when they have a mental breakdown and become demented, no other cause being assignable than their inherent mental instability.

The first attack may be delayed until advanced age ; but the more unstable a patient is, the earlier will be the incidence of insanity.

Periodic insanity is comparatively rare and differs from the above form in that the intervals between the attacks are approximately of the same duration, the attacks themselves are approximately of the same duration and each is an almost exact replica of a former one.

This state of affairs will be readily understood on reference to the accompanying diagram, in which red represents mania or some delusional condition, black represents melancholia or stupor and the linear spaces represent intervals of sanity.

Periodic insanity does not tend to dementia to the same extent as intermittent insanity. I have seen patients with recurrent mania or recurrent stupor of many years' duration, who suffered from as many as twelve attacks in the course of the year but did did not show the least sign of dementia during the intervals of insanity.

At any stage in the course of intermittent or periodic insanity it may happen that either a maniacal or melancholiac stage persists. In such cases the condition becomes one of chronic mania or chronic melancholia.

The duration of the whole cycle in any of these states may be two days to two years, and this remains the same for each patient throughout the whole of life. Similarly, the duration of any given phase remains the same for each patient in each of his cycles. The various phases, however, of each cycle are not necessarily of equal duration as represented for convenience in the diagram.

The transition from one phase to the other may take place suddenly, slowly or by oscillation. In cases in which the duration of the different phases is short, the transition is usually abrupt and occurs at that important time in a man's life, two o'clock in the morning, when his temperature and vitality are at their lowest, the time of onset of attacks of asthma and gout, the time when the phthisical patient feels most miserable, and the usual time of both birth and death.

In other cases the attack of mania or melancholia subsides gradually during the course of a few days ; but the patient, instead of recovering, as he apparently promises to do, becomes by degrees more and more depressed or excited.

In yet other cases a melancholiac becomes excited for an hour or so, then sinks back into his state of depression. He becomes excited again, but for a greater length of time, and again he is depressed. This process is repeated several times, the attacks of excitement becoming longer and those of depression shorter, until at last a definite attack of acute mania is established. The converse may happen in the transition from mania to melancholia.

Etiology.—The essential cause of the disease is mental instability, congenital or acquired. Congenital instability is usually the result of defective heredity, ancestors of the patient having suffered from mental disease, quite commonly from intermittent insanity. The Falrets, father and son, were able to observe three separate families in which circular insanity occurred in the grandmother, mother and daughter. Acquired instability may be the result of alcoholism, acute disease or inanition. Exciting causes are mental and physical shock, traumatism, gestation and parturition.

MELANCHOLIA.

Melancholia is a phase of intermittent or periodic insanity, characterized by a condition of misery in excess of that which is justified by the circumstances in which the individual suffering

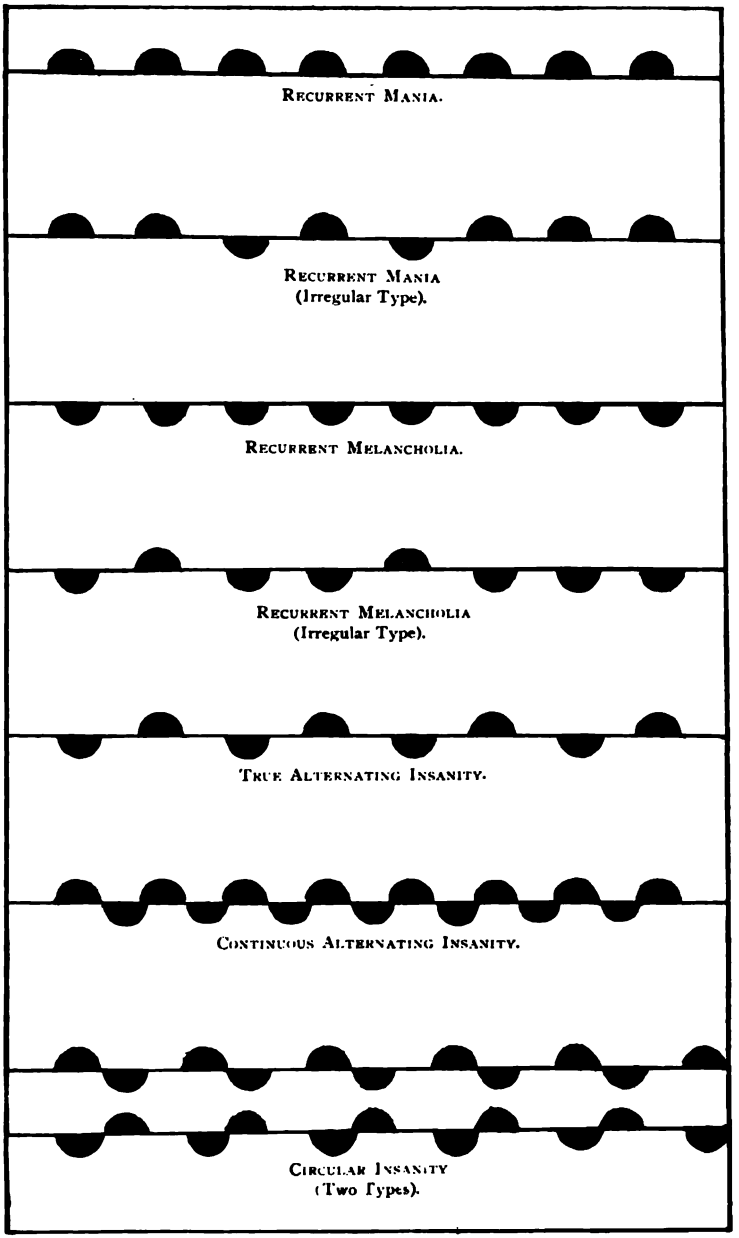

Fig. 33—Periodic Insanity.

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from it is placed, and by lack of energy owing to temporary weakness of the muscles controlling the movements of the large proximal joints. Kraepelin and his followers confine the use of the word 'melancholia' to cases of senile depression; but such a limitation of the word is considered by the physicians of this country to be unwarranted.

The several varieties may be classified according to (1) what the patient does and (2) what he thinks.

I.	II.
Stuporose melancholia.	Simple melancholia.
Agitated melancholia.	Hypochondriacal melancholia.
Resistive melancholia.	Delusional melancholia.

Stuporose melancholia is characterized by defect or absence of voluntary movement, agitated melancholia by excess of certain movements and resistive melancholia by active resistance to being attended to or cared for in any way by others.

Simple melancholia is characterized by the absence of delusions, hypochondriacal melancholia by the existence of delusions concerning the patient's bodily organs and delusional melancholia by the existence of delusions concerning other matters. These several varieties will be more fully considered after dealing with the symptomatology of melancholia in general.

Melancholia has its physical signs as well as its psychical symptoms; the latter are dependent on the former which are therefore considered first.

Physical Signs.—The general health of the melancholiac is bad. There is usually a history of loss of weight. His complexion is rather muddy on account of an abnormal dryness of the skin; the secretion of sweat and sebum are diminished, so that the latter is apt to collect in little dry masses on the surface, especially about the face. The hair is unnaturally dry and in severe cases 'stands on end', refusing to lie down in obedience to the comb. The nails are brittle and inclined to split. It has been ascertained that the toxicity of the sweat is diminished or, at any rate, not increased.

The patient is paler than when in health, partly on account of a slight chlorosis, the red cells being a little diminished in number and the hæmoglobin more than proportionally diminished in amount. The specific gravity and the isotonic (osmotic) power of the blood are lessened, especially in agitated melancholia.

The temperature is slightly subnormal and rather irregular; the respiration is normal in frequency but shallow. The pulse is somewhat increased in frequency (80 to 100) and, as Craig has demonstrated, of high tension; but on account of feebleness of the cardiac systole it feels weak to the finger.

Disturbance of the digestive tract is invariable. The tongue is dry and coated with a white or brown fur and the patient frequently complains of abdominal uneasiness. The latter is largely an abdominal sensation of nervous origin, but there is no doubt that it is partly due to indigestion. The gastric mucous membrane, like the lingual, is dry and furred to such an extent that in severe cases washings from the stomach are tinged brown. The patient has no appetite; he loathes the very sight of food, which in severe cases causes sometimes pain, sometimes vomiting. Examination of a 'test breakfast' shows increase of hydrochloric acid and deficiency of pepsin in the gastric juice. The toxicity of the gastric juice is greater than normal. Melancholiacs are invariably constipated, partly on account of weakness (*vide infra*) of the abdominal muscles and partly on account of deficiency of the intestinal juices. Except when diarrhœa is present, itself due to constipation, the fæces are dry and hard so that it occasionally becomes necessary for them to be digitally removed from the rectum. Examination of the abdomen reveals no physical signs of disease.

The quantity of urine passed during the twenty-four hours is diminished and its specific gravity increased in melancholiacs before undergoing treatment; but the reverse is the case when they are taking large quantities of milk and other fluids. There is an increase of the earthy phosphates in the urine and a decrease of the alkaline phosphates, of the sulphonates, of the total quantity of nitrogen and presumably of urea, since there is an increase of urates and uric acid. The toxicity of the urine is increased, especially in those patients who suffer much from indigestion. This toxicity is possibly due to indoxyl, which is found in the urine of melancholiacs.

Contrary to the popular idea of melancholia there is as a rule no abnormal secretion of tears; that secretion is diminished with all the others. And when melancholia occurs as a sequel to parturition the secretion of milk is diminished or arrested.

The generative function is disturbed in both sexes. Male melancholiacs are usually impotent, probably because the pleasurable

tone of feeling associated with the sexual act is out of harmony with their general feeling of misery. In females amenorrhœa occurs during the acute stage of the disorder, and disappears as the patient recovers or passes into a condition of chronicity.

The most important physical signs, however, which this disorder presents are referable to the nervous system. True headache is not very common but patients frequently complain of a sense of pressure on the top of the head.

It is rare for convulsions to be associated with melancholia, and in those cases in which they occur they are infrequent.

Most striking and important among the physical signs of disorder of the nervous system are the motor disturbances. The attitude and general appearance of the melancholiac are quite characteristic. Sitting, walking and lying are uncomfortable for him: he therefore stands. The head and trunk are inclined forwards as in paralysis agitans and there is slight flexion of the hips and knees. There is also slight flexion of the shoulders; and the elbows, which are rigidly held to the side, are flexed to a right angle. In cases of agitated melancholia the fingers are in constant movement during waking hours.

FIG. 34.—MELANCHOLIAC WRINKLING.

The facial expression is that of misery; the corners of the mouth are turned down and the forehead wrinkled. The wrinkles may be either transverse from contraction of the frontales or vertical at the root of the nose from contraction of the corrugatores superciliorum. These transverse and vertical wrinkles may occur together in the same patient so as to give an appearance which has been compared by French authors, not very appropriately, to the Greek letter ω.

The attitude and appearance above described are dependent

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on rigidity, which is most easily observed and investigated in severe cases of stuporose melancholia. The rigidity affects the large proximal joints most and the small peripheral joints least; for this reason I have called it 'proximal rigidity', in contradistinction to 'peripheral rigidity', such as that which occurs commonly in hemiplegia. The voluntary muscles of the trunk (especially back and neck) are most affected, those of the shoulders

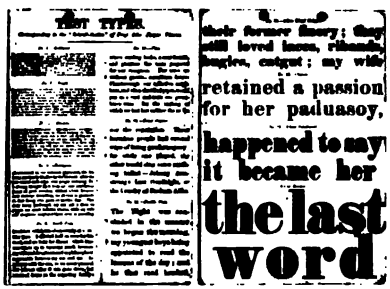
FIG. 35.—MELANCHOLIAC HANDSHAKE (LEFT).

FIG. 36.—MELANCHOLIACS SHAKING HANDS.

and hips to a less degree and those of the elbows and knees to a still smaller degree. The wrists, fingers, ankles and toes are usually free from rigidity.

Coextensive with rigidity, as in many other nervous diseases, there exists slight paralysis (weakness) of the affected muscles. Melancholiacs can rarely hold their arms vertically above their heads and when they shake hands they do so from the wrist.

Fig. 37.



Facsimile of test-types used in the investigation of melancholia by which it may be determined that melancholiacs suffer from weakness, i.e. partial paralysis, of accommodation.

To face page 181]

They walk slowly and from the knees rather than from the hips. The patients themselves state that they have ' difficulty in doing things '. The condition is one of slight double-hemiplegia : the bilaterally acting muscles are therefore affected. Although ordinary reflex (medullary) respiration is unaffected, voluntary respiration of cortical origin (taking a deep breath) is shallower than natural, a symptom which sometimes causes the patient to believe that he has ' no breath '. Melancholiacs have difficulty in showing their upper teeth; they have to open the mouth widely in order to do so.

I have observed two ocular symptoms of this paralysis : one is nystagmoid jerking on extreme lateral deviation of the eyes and the other is weakness of accommodation. I have prepared some very small test-types by photographing the ordinary test-types for reading. Shortly after admission I make a note of the largest of these types which the patient is unable to read and I find that, on recovery, he is able to read it easily, and often a type two or three sizes smaller. Melancholiacs sometimes complain that near objects look larger than natural; this suggests the similar symptom in true internal ophthalmoplegia.

I have suggested that the sensitiveness of the melancholiac to noise is due to weakness of the tensores tympanorum, but this must form a subject of future investigation.

Phonation is weak, lower pitched than in health and monotonous. Similarly articulation is weak, the patient appearing to a casual observer to take less trouble than usual in the pronunciation of words.

In the less severe forms of melancholia speech is deficient and in melancholiac stupor absent. Even in mild cases of simple melancholia it is an effort for the patient to join in a conversation and still more of an effort to originate one. Melancholiacs are slow in reacting to questions, slow, as in all their actions, in answering them, and their answers are as brief as they can conveniently be made. There is no true aphasia, motor or sensory.

Writing, which is but another mode of speech, is similarly affected. Writing is a trouble to melancholiacs ; hence, in the acute stage at least, it is slow and the calligraphy is so altered that it resembles that of a child. All this is nothing more than a special department of the slight universal paralysis above referred to.

The superficial reflexes (scapular, epigastric, abdominal, plantar etc.) are all, as in hemiplegia, less marked than in health. The plantar reflex is associated with a flexor response of the great toe.

During the acute stage the tendon reflexes are all brisker than normal; this is especially well seen in the jaw-jerk and knee-jerk. The knee-jerks are equal and characterized by quickness of reaction, both in the forward and backward movement, especially in the latter. As a result of this the actual excursion of the foot is small. If, in testing the knee-jerk in the acute stage of melancholia, a finger be placed behind the knee the semimembranosus tendon will be felt to spring into prominence in apparent simultaneity with the tap on the patellar tendon. Clonus practically never occurs.

The electrical reactions of the muscles are normal.

Mental Symptoms.—Sensation is normal in a typical case of melancholia. Peripheral anæsthesia only occurs as a complication in a few cases. When it occurs, it is to be regarded as an exhaustion symptom.

Perception is normal and the patient is able to understand the nature of his environment. He cognizes objects and recognizes people correctly. Except for lack of attention, to be presently described, the appreciation of time and space is good. Hallucinations do not occur in uncomplicated acute melancholia, but some cases of chronic melancholia are complicated by hallucinations of hearing.

The psychical characteristics of melancholia depend upon the physical, especially the motor, symptoms. The combination of an attitude of general flexion and adduction, shallow respiration, constipation and high blood-pressure gives rise to a feeling of depression.

There is paralysis of volitional, instinctive and emotional reaction. Accordingly the patient complains that his will-power is gone, that he is unable to occupy himself as in the past. He cannot bring his volitional attention to bear upon matters which concern him, even when they are of the utmost importance. Such is the paralysis of volition that even automatic acts, everyday habits of life, may cease to be performed.

Similarly there is paralysis of emotional reaction. The musculature has fixed the patient in an attitude of misery and nothing will alter it. You may tell him the most excellent joke, but he does not laugh; you may tell him that his favourite

daughter is dead, but he does not weep. He says that he cannot feel such things now. This *loss of feeling*, of which melancholiacs complain, has been misconstrued by many authors into *loss of sensation;* but the difference between the two symptoms needs only to be pointed out to the student to prevent him from falling into a similar error.

In like manner instinct is paralysed. The melancholiac has no desire for outdoor games, for social or sexual intercourse, or even for food. Not only is there paralysis of the instinct to eat, but the patient also suffers from indigestion, due to his constipation and apepsia. Under such circumstances it is no matter for surprise that food is revolting to the patient and that he frequently refuses it altogether. He has no self-confidence, his instincts of emulation and rivalry are gone. If he is a collector of any sort of thing, he loses interest in his collection and now suggests that he has wasted his life over it. He is neither constructive nor destructive. In severe forms of melancholiac stupor the instincts of locomotion and of cleanliness are gone; the patient stands immobile and may even be wet and dirty. Instinctive attention is paralysed and apparently, in a few cases, even reflex attention, so that the patient cannot be startled.

The memory of melancholiacs is quite good except in so far as they lack interest in and pay no attention to events going on around them.

There is nothing characteristic in the temperament of melancholiacs previously to their attack, except perhaps in the case of senile melancholia. With advancing age a man's general temperament tends to be more and more serious and tinged with a constant feeling of depression as, little by little, he sees all possibility of attaining the ambitions of his youth vanishing away. When a man retires from business, his days of labour being over, he sees that there is no more money coming in, has visions of a penniless old age and very naturally becomes depressed. Senile melancholia is probably nothing more than an exaggeration of this normal depression of old age.

Melancholiacs have difficulty in getting to sleep; they awake unrefreshed and their depression is accordingly worse in the early morning. During the acute stage of their disease they have bad dreams. Happy dreams are one of the earliest symptoms of recovery.

All melancholiacs are potential suicides, but some are so

suicidal that they are constantly on the watch for an opportunity to do themselves bodily harm; their life is devoted to courting death and they require the closest supervision. Some authors go so far as to classify such patients separately as cases of 'suicidal melancholia'; but this is not to be recommended lest it should divert attention from the fact that all melancholiacs are liable to commit suicide.

Most melancholiacs have good insight into their condition; but if once they lose sight of the truth that all this enormous wealth of symptoms is due to an illness, those very symptoms at once become the premises for erroneous judgments; not that they reason logically or illogically about their symptoms, but that their symptoms give them the feeling that such and such is

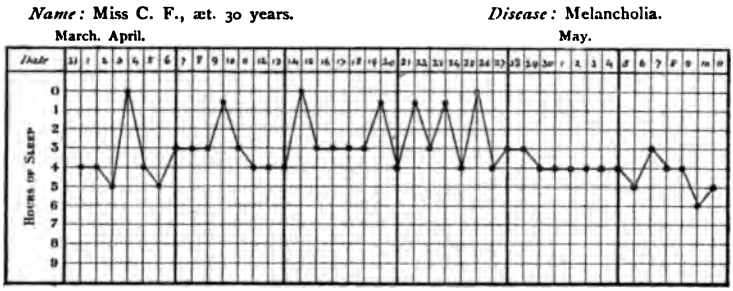


FIG. 38.

the case and, for no other reason than that they have this feeling, they judge and believe it to be so.

They feel that their will-power, their emotions, their instincts, their attention and their ordinary habits of life, all symbolic of a living spirit within, have ceased. In other words, they feel and therefore judge and believe that their soul is lost. Hence arise the delusions that they are deserted by God, eternally damned, have committed the unpardonable sin, are everything that is vile and worthless, unfit to live and already suffering the tortures of hell.

If they are animists, they think they are dead, non-existent, or 'a little spot of black away in the distance'. A few patients interpret the symptoms more materially and believe their brain to be gone, a delusion which is fostered by a peculiar feeling of numbness about the head, complained of by many patients.

Hypochondriacal melancholiacs, who are impressed by the

physical rather than the psychical manifestations of their disease, complain of the weakness and sometimes of the stiffness. Some say that they are paralysed, a judgment which scarcely deserves to be called a delusion ; others go so far as to say that their legs are made of glass or some such brittle substance, and they behave accordingly.

If it is the abdominal discomfort, due to indigestion and constipation, which has most impressed the patient, he believes that his bowels are obstructed, that they are on fire, that he is about to suffer torture from peritonitis, that his throat is blocked up, that the food goes into his head, that his abdomen is distended with food and that there is no more room inside, that he is filled up with cancer, and so forth in endless variety.

The amenorrhœa of the female melancholiac gives rise occasionally to the delusion that the patient is pregnant, and she accuses herself falsely of adultery with some man towards whom she may in the past have entertained tender feelings.

Senile melancholiacs are liable to develop delusions of financial ruin and to accuse themselves falsely of having led a reckless life, of having failed to save money for their old age or of having ruined their firm by falsifying the books. It is useless to show them the books in order to demonstrate that all is well ; nothing will change their delusion.

All the above patients attribute their condition to something amiss with themselves ; but there is another class of melancholiacs, much smaller than the last, who ascribe their condition to interference by other people. These interpret their inability to do things as due, not to their own weakness, but to an increased resistance in their environment. They feel that they could occupy themselves as they did formerly, were it not that their occupation had been made more difficult for them. In this way they develop delusions of persecution, they believe that other people are against them, even that there are world-wide conspiracies to do them harm. This is one of the forms of so-called 'acute paranoia', a confusing term which should be allowed to drop.

Clinical Varieties. — States of melancholia vary in degree, from little more than a 'fit of the blues' to a condition in which nearly all the symptoms above enumerated may easily be detected ; but apart from this there are several well-marked clinical varieties.

Stuporose melancholia (melancholiac stupor, melancholia attonita) is a condition in which the paralysis is so complete that the patient neither moves nor speaks. Left to himself, he stands silent and motionless in the same position, rigidly fixed in the characteristic melancholiac attitude already described.

Agitated melancholia is a condition in which the patient, while preserving the characteristic melancholiac attitude, is in constant movement; this movement takes place, very naturally,

FIG. 39.—AGITATED MELANCHOLIA.

in just those parts which are least paralysed, viz., the fingers and wrists, knees, ankles and, when not restrained by boots, the toes. He paces about, walking, not from the hips, but from the ankles and knees, wringing his hands, picking pieces of skin from his fingers or face, or fumbling with the buttons of his coat. These movements are usually accompanied by a certain amount of speech, such as 'Oh dear! How dreadful! What a wicked wretch I have been!' and so forth. Craig has ascertained that the blood-pressure is lower than normal in these cases.

Resistive melancholia is a variety in which resistance to the usual attention and care is the most striking feature. It is a rare condition. Most of the cases formerly classed under this heading are now recognized to be katatoniacs.

Hypochondriacal melancholia, which may appear in the guise of any of the above forms, deserves special recognition because of its relatively somewhat intractable nature, and also because of the special proclivity of its subjects to suicide, generally with the idea to calling attention to their case.

FIG. 40.—MELANCHOLIAC GAIT.

Melancholia may be said to have become chronic when most of the physical signs of the acute stage have passed off, while the patient remains in a persistent physical and therefore mental attitude of misery.

In some cases of delusional melancholia the physical and mental attitude of misery pass away, but the patients are left with a disordered judgment and retain their delusions. Such cases should be designated 'melancholiac secondary delusional insanity'. On the Continent it is called 'melancholiac secondary

paranoia'; but it is better to reserve the term 'paranoia' for the condition hereinafter described as such.

Prognosis.—Unless the case has been improperly treated in its early stages and has passed into a condition of chronicity before being placed under skilled care, melancholia should always be regarded favourably. The signs of chronicity are disappearance of the physical signs. If the digestion has become normal and the obstinate constipation has disappeared, if the urine is normal and the menstruation regular, and if the patient looks physically in good health and has become fat without corresponding mental improvement, the case may be regarded as chronic. Other signs of chronicity are the development of hallucinations of hearing and, in women, the growth of bristly hair on the face.

In the majority of cases, chronicity is reached or recovery achieved within six months of the onset of the disease.

In a few cases the general nutrition of the patient is disturbed to such a degree that death occurs as the direct result of the melancholia.

There is little tendency for dementia to supervene in chronic melancholia, but it occurs in a few cases. Even chronic melancholia need not always be regarded as hopeless. The author has had one case of recovery after eighteen years' duration, and has had under his care one patient (male) who had recovered from a previous attack of thirty-five years' duration and another (male) who had recovered from a previous attack of seven years' duration. One severe case of senile melancholia recovered after three years.

Treatment.—Improvement of the general nutrition is the keynote of the treatment of melancholia. In order to attain this result the patient must have:

1. Complete mental and physical rest.
2. A good, plain, liberal diet.
3. Careful supervision to prevent self-injury.

He must be put to bed and well fed.

The treatment of melancholia by rest in bed requires to be insisted upon. By some misconception of the nature of the disease a regrettably common notion has got abroad that the melancholiac requires to be 'roused' out of his condition. At the present time the watchword of the older neurologists is 'travel', that of the younger neurologists is 'distraction'; the

result is the same in both cases, for the patient is sent sight-seeing, perhaps all round the world.

And if the patient is sent to an institution for the insane, I believe I am understating the facts when I say that, in nine cases out of ten, the chief endeavour of both doctors and attendants is to make the patient occupy himself in some way or other : ' occupation ' is the watchword in most asylums.

Now I say nothing against occupation for chronic patients in good physical health ; but to set a patient suffering from acute cerebral disease to work, merely because that disease has psychical manifestations, is, I venture to assert, most irrational.

Rest in bed is recognized as correct treatment for functional or organic disease of any other organ than the brain. I have, indeed, heard of a lay person recommending a patient suffering, for example, from acute rheumatism, to ' walk it off ', but not of a physician recommending such treatment.

But as soon as the brain becomes disordered, the whole of the fundamental principles of medical treatment are set aside and the organ is worried to distraction.

Nature does what she can in the matter and suggests the correct treatment by paralysing the patient ; and, if the physicians would adopt her suggestion, they would not only be doing a duty to themselves by obtaining more satisfactory results, but they would be also doing a duty to the community by reducing the number of chronically insane.

This bed-treatment is no novelty. Griesinger recommended it as long ago as 1865 and I am justified in my earnest advocacy by its being now almost universally adopted in France, Germany, Holland, Switzerland and Russia. It must not be shirked merely because there are difficulties in the way. Surely the chief interest of our profession lies in the facing and overcoming of difficulties.

The first difficulty is that the patient objects to bed ; but every physician of experience knows that the melancholiac objects to any form of treatment. A competent attendant soon overcomes this objection by taking away the patient's clothes at the first opportunity. Some patients, by way of excuse, say that bed makes them worse ; but they soon alter their opinion if the physician remains firm.

The second difficulty is that the patient either sits up in bed and refuses to lie down, or he does not remain in bed at all but

stands by the bedside. Here again a tactful attendant can do a great deal, and his work may be lightened by the use of sedative drugs. To young patients a couple of drachms of paraldehyde, night and morning, give not only the desire for rest, but also a certain amount of much-needed sleep. In older patients half a drachm or less of the liquor morphinæ bimecomatis three times a day works like a charm. Tincture of hyoscyamus may also be used with advantage in some of these restless case.

The *insomnia* must be combated by placing the patient in circumstances conducive to sleep. The room must be quiet and warm, but not stuffy; there should be sufficient bedclothes, but not too many. When these measures are insufficient, a glass of hot milk at bedtime often serves as a useful hypnotic. Frequently, however, it becomes necessary to resort to the use of drugs.

There is a great multitude of hypnotics to select from, but they must not be used indiscriminately; the nature of the insomnia should be first ascertained.

When the patient is fairly somnolent, but liable to wake at frequent intervals during the night, a good sedative at bedtime is:

Potassium bromide	gr. xxx.
Tincture of hyoscyamus	ℿxl.
Water	℥j.

When the patient has difficulty in getting off to sleep but remains asleep if once started, the following is a good prescription:

Paraldehyde	℥ij.
Aq. menth. pip.	ad ℥j.

If a more prolonged effect is required than can be obtained by means of paraldehyde, amylene hydrate, in doses of 1 to 1½ drachms in an ounce of water, is strongly to be recommended.

Sulphonal is not to be recommended for melancholiacs. It is liable to accumulate in poisonous doses in the intestines on account of the extreme constipation, and to cause hæmatoporphyrinuria. Such a result is to be deplored, for many of the patients suffering from this complication die within three weeks; and further I have never yet seen a patient recover from mental disease who has suffered from hæmatoporphyrinuria. Sulphonal is a drug which is known to produce degeneration of the neuron, and it is in all probability this action which accounts for the incurability of patients who have been poisoned with it.

The same remarks apply to trional. This drug, however, is less liable to cause hæmatoporphyrinuria, but more liable to cause neural degeneration; so much so, that Soukhanoff, in his experiments on degeneration of the neuron in animals, found that trional produced this effect more readily than any other drug.

Nevertheless, I have seen good results from the use of both sulphonal and trional in senile melancholiacs, who are less liable to hæmatoporphyrinuria than younger patients. It may also be remarked that males are less liable to this condition than females.

As soon as the urine becomes tinged with red on account of the presence of hæmatoporphyrin, the correct treatment is to get rid of the accumulation of sulphonal or trional in the intestines by obtaining a free action of the bowels, and to administer copious doses of lime-water, 5 ounces with an equal quantity of milk every four hours.

The author's experience of veronal, a drug which has been much vaunted of recent years, has not been satisfactory. If the insomnia is absolute and a sufficient dose of veronal be given to procure sleep, it also induces vomiting on the following morning. The drug is useful in milder cases.

Enough has been said of physical rest; now with regard to *mental rest*. The notion of giving the patient something to occupy his mind is still much too prevalent in this country. Patients are given games to play, cards, draughts and even chess in order to occupy the mind; or they are given odd jobs to do, with the same object, and incidentally to relieve the attendants.

Now I hope that no words of mine will serve to increase unnecessarily the already too heavy labours of attendants on the insane. But the attendants can hardly be said to be relieved when the result of this treatment is a prolongation of the acute stage of the patient's illness or the conversion of an ordinary melancholiac into a heavy nursing case. It may be argued that occupation gives the patient something else to think about. Verily it does give him 'something else' in the sense of 'something more' to think about; but his mind is concentrated on his own wretched condition as well as his occupation. As to the games, can anything be more incongruous than to allow a patient who requires mental rest to play chess? Chess at least should be contraband of acute insanity.

By all means let the convalescent and chronic patients assist

the attendants or play games ; but let not patients in the acute stage of mental disorder be treated by worrying the very organ which is affected, lest it lead to permanent mental disablement.

It is sometimes argued that the patient must think of something, and it is best that he should not think of his own mental troubles. I cannot agree with this view. The amelioration of the insane is already far advanced if they have been induced to believe that their state is one of illness and that the illness is curable ; and nothing will impress these facts upon them more than to make them lie in bed and do nothing, just like any ordinary hospital patient, and to see that the doctors and attendants are doing their very best to procure their recovery.

Nourishment.—One of the most important instruments in the armamentarium of any institution for the cure of melancholia is a weighing-machine ; and the feeding of the patients must be so adjusted that the machine shows, week by week, a steady increase in their body-weight. This fundamental principle in the treatment of mental disorder has been called the ' gospel of fatness '. Patients must be fed on a good, plain, nutritious diet, without excess of nitrogenous constituents.

If a patient fails to increase in weight, extra food should be insisted on. The form which this extra diet takes must be left to the discretion of the physician. The writer is in the habit of recommending three extra pints of milk, with or without the addition of cream. Other useful adjuncts are a mash of bananas and cream after dinner, a cup of hot cocoa at bedtime, and chocolates.

Cod-liver oil may be strongly recommended, not the nasty, oily, indigestible, yellow product, but the old-fashioned brown, fishy oil, from which the jecorin and other digestive constituents have not been removed by refining processes.

Care must be taken not to carry this overfeeding to excess, lest it defeat its own object by upsetting the patient's digestion, making him sick, and rendering food even more objectionable to him than it was before.

Food may be made a little more pleasant by giving the patient an appetizer a quarter of an hour before meals, such as :

Dilute nitrohydrochloric acid	℥x.
Tincture of nux vomica	℥x.
Syrup of orange	ʒj.
Compound infusion of gentian	to ℥j.

A glass of port with dinner serves as a useful digestant.

It is also to be remembered that these patients suffer from apepsia, they may therefore be allowed a small dose of liquor pepticus immediately after meals.

For various reasons, melancholiacs at times refuse to take sufficient nourishment to increase their body-weight. This may occur even among convalescents, who become anxious about their previously slim figures. With the latter class, those in attendance upon the patient should tactfully fail to observe any notable increase in the patient's rotundity.

All too frequently, however, refusal of food is a persistent symptom, which can be combated by forced feeding only. As soon as the patient ceases to put on weight, there must be no quarter; it becomes the duty of the attendants to force with a spoon the last portions of each meal upon him. And if the resistance is so active that such measures fail, it is necessary for the patient to be tube-fed.

Massage and gentle faradism are also to be recommended as further aids to nutrition. The massage, which is most advantageously carried out between ten and twelve in the morning, should be general, or ought to be employed at least for the neck and shoulders, spine, hips, thighs and abdomen. The faradism, which should be stimulating but not too unpleasant, should be employed over the same areas with the exception of the abdomen.

The constipation of melancholia is often very troublesome to treat. For the treatment of this symptom the reader must refer to works on general medicine; but he should remember that melancholiacs, and the insane generally, require stronger purgatives and larger doses of them, than constipated members of the sane population. It is frequently necessary to resort to copious enemata of soap-and-water. The writer often employs the following compound enema for his patients, who find it both effectual and comforting:

Olive oil	O.ss.
Castor oil	℥j.
Glycerine	ʒj.
Turpentine	♏v.

Digital evacuation of the rectum is occasionally necessary.

When the patient's nutrition begins to show signs of considerable improvement he may be allowed to get up, at first for a few

hours in the evening, bed treatment being then gradually reduced.

During this period of convalescence he may begin open-air exercise in the form of drives or short walks and, while he is indoors, occupation, games and entertainments all make for recovery. Should he show any signs of relapse, he must be sent back to bed for further treatment.

Prevention of Suicide and Self-Injury.—Patients must be deprived of all means of doing themselves bodily harm. Poison and firearms are, of course, absolute contraband of lunacy. Knives and scissors should be under lock and key and the attendant in charge of such articles should know exactly how many there are. On each occasion when they have been used they should be re-counted in order to ascertain that none are missing before locking them away again. Similarly medicines should always be under lock and key.

The rooms in which the nursing is carried out should be free from projections liable to serve as possible conveniences for the patient to hang himself.

Gas-flames and fires in the room should be protected by strong wire guards.

The patient should not be allowed a handkerchief at night lest he strangle himself with it under the bedclothes ; nor is it permissible for him to wear sleeping garments made of any substance which may be torn noiselessly, *e.g.*, flannelette, lest he use a strip for purposes of strangulation.

Melancholiacs, at least those who are especially suicidal, should be under constant observation and have no opportunity of secluding themselves. It should be impossible for them to obtain possession of any keys, and there should be no bolt to the door of the w.c.

Constant supervision is the best safeguard for suicidal patients ; but, even under the most careful observation, they contrive at times to do themselves injury. A chance cup of boiling tea suffices to produce a fatal œdema of the glottis, a secreted hairpin may serve the purpose of a dagger or a sudden dive from the height of an ordinary chair suffices to fracture the base of the skull. It speaks volumes for the attendants on the insane that suicides are not more frequent in asylums.

Occasionally it happens that the physical signs, so far as our crude methods of examination are able to detect, pass away

and the patient gets fat and apparently well in physical health, without corresponding improvement in his mental condition. This is especially liable to happen in patients who have just passed through an attack of acute mania. Physical health has been restored apparently to perfection, but the mental improvement 'o'erleaps itself and falls on the other', and they become depressed. If, after a further course of treatment on the lines above recommended, the patient remains persistently depressed, what is to be done ?

It has been observed that some such patients make a rapid recovery after an attack of acute physical illness, *e.g.*, erysipelas. Accordingly it has been recommended that an acute physical illness should be induced and the illness which has been selected for the purpose is hyperthyroidism. The patient is put to bed and treated for a week with thyroid gland, conveniently in the form of tabloids. During the course of the

First day, he takes	30	grains of	gland—	6	5-grain	tabloids		
Second ,, ,,	40	,,	,,	8	5	,,	,,	
Third ,, ,,	50	,,	,,	10	5	,,	,,	
Fourth ,, ,,	60	,,	,,	12	5	,,	,,	
Fifth ,, ,,	50	,,	,,	10	5	,,	,,	
Sixth ,, ,,	40	,,	,,	8	5	,,	,,	
Seventh ,,	30	,,	,,	6	5	,,	,,	

at suitable intervals. His temperature should be taken regularly and the pulse carefully watched. Slight rises of temperature are unimportant, but irregularities of the pulse should be treated with digitalis and strychnine. Patients with a small thyroid must be treated with smaller doses of the gland. The patient loses 5 to 10 pounds during the treatment, sometimes improves mentally, but more often deteriorates. Towards the end of the week he begins to look physically ill. The ordinary treatment of melancholia is now started *de novo* and in quite a satisfactory proportion of cases the end justifies the means. The patient passes through a short stage of convalescence and finally recovers.

MANIA.

Mania is that phase of intermittent or periodic insanity which is characterized by a condition of excitement or exhilaration in excess of that which is justified by the circumstances in which the individual suffering from it is placed and by disproportion-

ately excessive activity of the movements of the large proximal joints.

Four varieties have to be considered, viz. :

Simple mania.
Acute mania.
Acute delirious mania.
Chronic mania.

Mania, like melancholia, has both physical signs and psychical symptoms, the latter being dependent on the former. The physical signs of the several varieties of mania differ in degree only, but they are most characteristic in **acute mania.**

Physical Signs.—Although the maniac persists, as a rule, in maintaining that he is in excellent physical health and feels well, strong and virile, his general health is in reality far from good.

There is usually a history of loss of weight ; he looks ill and pale and is perhaps anæmic. The tongue is furred, the appetite poor and the bowels constipated ; but these signs are not so marked as in melancholia, for the maniac at times eats voraciously and the bowels may act regularly.

There is an increase in the quantity and amylolytic power of the saliva ; and there is an increase of hydrochloric acid in the gastric juice, which has been found to be more toxic than normal.

The pulse is frequent, but not as a rule disproportionately frequent in relation to the patient's motor activity ; and the blood-pressure, according to Craig, is lower than normal. There is slight chlorosis and the toxicity of the blood is increased. The temperature is normal, except in acute delirious mania.

There is increase of nearly all the secretions. The sweat is abundant and is said to possess a ' mousy ' odour. In puerperal cases the secretion of milk is increased and liable to cause trouble by tending to the formation of mammary abscesses.

The quantity of urine is increased, and there is an augmentation of the total quantity of solids which it contains. Injected into animals the urine of maniacs is said to cause local spasms, hypothermia and mydriasis.

In women menstruation is irregular in time and in quantity ; but it is rarely suppressed as in melancholia.

Signs of disorder of the nervous system are, however, most important of all. General hyperæsthesia, which will be subsequently considered, is the rule.

There are no paralytic symptoms and no rigidity. On the other hand, the most characteristic feature of acute mania is great motor excitement. A rather coarse tremor of the hands and face occurs in rare cases.

Observations on movements of the insane in general, and of maniacs in particular, are best made on female patients in the garden; because females react more readily than males to ordinary stimuli, and movement is less restrained in the open air.

The movements of a maniac in a state of motor excitement take place for the most part at the large proximal joints. The

FIG. 41.—ACUTE MANIA.

trunk sways freely as the patient walks, and when he runs, there is exaggerated movement at the hips. In the waving of the arms which is common in mania, the greatest movement takes place at the shoulders and there is little movement of the hands and fingers. The maniacal handshake is from the shoulder and the maniacal attitude of prayer is with hands upraised to heaven; whereas the melancholiac attitude of prayer is with hands clasped in front of the sternum. The typical attitude of the maniac is with the elbows abducted from the side whereas that of the melancholiac is with the elbows close to the side. It is interesting to correlate this observation with the

results obtained from normal people with the automatograph (p. 52).

The superficial reflexes (scapular, gluteal, cremasteric and plantar) are exaggerated. Stroking the sole of the foot elicits a flexor response of the great toe. The tendon reflexes, *e.g.*, knee-jerks, are usually diminished during an attack of motor excitement but frequently exaggerated during a period of rest.

Mental Symptoms.—In the course of an attack of acute mania two stages have to be recognized: the stadium acutum

FIG. 42.—ACUTE MANIA.

and the stadium debilitatis. The mental characteristics of these must be separately considered.

In the *stadium acutum* there appears to be augmentation of all modes of sensation. Patients in this condition are sometimes able to hear every word of an ordinary conversation fifty yards away, provided they are undisturbed by other sounds; and I have known a patient call my attention to the ringing of church bells which I have only just been able to detect and were quite

inaudible to a neighbouring attendant. Similarly, if the point of a pin be lightly applied to the patient's skin, he starts or screams. Faint odours also are easily detected by acute maniacs. These symptoms are of importance in the differential diagnosis of mania from some other states of excitement.

FIG. 43.—MANIACAL HANDSHAKE.
(Drawn from a photograph.)

Perception is normal and sometimes excessively keen. Hallucinations and illusions do not occur, except as a rare complication of the disease.

The maniac has deficient control of his emotions; he laughs, cries or grows angry for little or no reason. Similarly he has

deficient control of his instincts ; he is erotic, in some cases to such an extent that modesty is lost, but this is rare. He collects rubbish systematically, hoards up old newspapers and stores away useless odds and ends with fantastic tidiness. He is at once constructive and destructive ; he tears up an old garment with the intention of converting it into a new one, but the renovation never takes place.

The instinct of self-adornment is exaggerated : simple maniacs adorn themselves with flowers, brilliantly-coloured ties and perhaps grotesque hats ; mild cases of acute mania decorate them-

FIG. 44.—MANIACAL HANDSHAKE.

selves with leaves and wear pieces of string on their fingers. Other patients, more severely afflicted, may perhaps tear the coloured borders off their blankets and swathe themselves fantastically to represent gipsies or Zulus. The instinct for mischief and practical joking is augmented. Ornaments are put on the fire, the gas is blown out and the room turned topsy-turvy for fun. The instinct of noisiness is exaggerated ; the patients scream, shout and sing. Their uncontrolled activity gives them an illusive sense of well-being, and they may hence become boastful and exalted about their capabilities.

Some such patients feel ready to defy death; a dangerous symptom, since it may lead them to commit suicide by accident.

> 'There with fantastic garlands did she come
> Of crow-flowers, nettles, daisies, and long purples,
> That liberal shepherds give a grosser name,
> But our old maids do "dead men's fingers" call them;
> There, on the pendent boughs her coronet weeds
> Clambering to hang, an envious sliver broke;
> When down her weedy trophies, and herself,
> Fell in the weeping brook. Her clothes spread wide;
> And mermaid-like, awhile they bore her up:
> Which time, she chanted snatches of old tunes,
> As one incapable of her own distress,
> Or like a creature native and indu'd
> Unto that element: but long it could not be,
> Till that her garments, heavy with their drink,
> Pulled the poor wretch from her melodious lay
> To muddy death.'

Maniacal patients are incapable of sustained volitional attention; but instinctive attention is easily roused, any chance percept serving to divert the current of their thoughts. In this way arises one form of incoherence. If, for example, a maniac be talking of his state of health, the rattle of keys will at once turn his conversation to the subject of keys, and so forth. Similarly, a word may suggest others rhyming with it; a hat laid on the bed may set him talking in this wise: 'That hat, cat, rat, bat,' etc., the chance sound claiming instinctive attention.

Association of ideas is very active with these patients, their ideation flowing more rapidly than normally, and more rapidly than words can be uttered to express them (so-called 'flight of ideas'). This symptom gives rise to another form of incoherence, in which connecting links in the train of thought are elided. In the following example, quoted from a police-report, it is possible to supply the links in some places, but not in others. Evidently it is not a case of mania, but it is a good example of incoherence: 'I have got millions of money and am going to Windsor. I went to heaven yesterday and it was very dark. My mother and dead relations welcomed me and I went out with them. The Lord said to me: "You are the Holy Ghost; the Trinity is now complete". I was born every evening and came here on the third. They said I was mad, but I was not. All the money I got I gave to the Lord and had not a penny left. I was with

some of the finest men, you know. I shall have France, and Russia as well, and there will be one God from north to south. We call this the Green Island and the Green Moon, and England will be called the Rose Moon. There will be ever so many more moons, and that is the explanation of all these little stars. I want a few millions, and I will make a million—ten millions—to-day. But I cannot move without the consent of the Queen to marry me. Every man will have as many wives as he likes. The Lord told me the reason, and there will be no more doctors. I shall have a thousand of the most beautiful women, and if a man takes a fancy to any of them he will have to pay me what I like, and all the money will go to the benefit of our glorious Empire. You should have seen how pleased my mother was. Every morning at half-past five all the little children were examined by God. I can read a man's character well. I can read yours. You are a very honourable gentleman; I know almost every incident in your life. I'm just going to Windsor now. Will you gentlemen have a silver moon luncheon with me? Charlie, old fellow, here is £5,000 for you. George, I will make a Cabinet Minister of you. I have been honourable to my foster-sister."

The memory of maniacal patients is good.

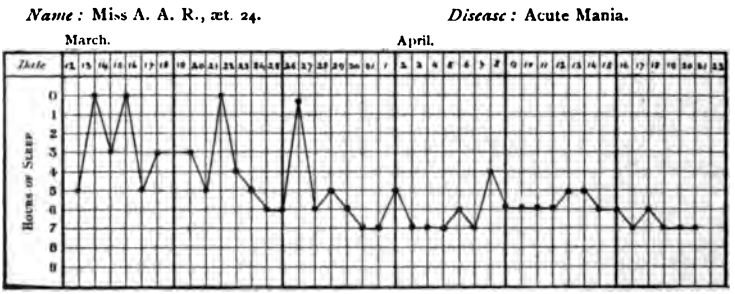


FIG. 45.

The insomnia of mania differs somewhat from that of melancholia in two particulars. In the case of a melancholiac the number of hours of sleep during each night remains fairly constant; in the case of a maniac the number of hours is extremely variable as shown in the accompanying chart. Further, what little sleep there may be in mania occurs during the earlier hours of the night; in melancholia it occurs during the later hours.

Most maniacal patients have good insight into their condition;

but if they lose that insight, delusions at once arise, usually as a result of their feeling of power arising from abnormal stimulation of the cerebral cortex.

Maniacs have a feeling of increased will-power and hence believe, in some instances, that they can influence the will of others. Such patients will stare at others in the belief that they are ' willing ' them to perform certain acts. They will tell the doctor that they are curing other patients by will-power. Some believe themselves to be lords, dukes, kings, God Almighty or possessed of untold wealth.

The speech of acute maniacs is commonly incoherent for reasons already considered. Articulation is normal.

The writing is also incoherent ; the calligraphy untidy, irregular and besmirched with blots. The first line may be written at the bottom of the page, the paper is then turned upside down or sideways and another line written and so on until the page is nothing but a tangled mass of words.

The second stage of acute mania is one of exhaustion, ' calm after the storm ', the so-called *stadium debilitatis*. After the stage of excitement has subsided the arms fall to the side and the patient sinks into a condition of stupor. He has anæsthesia of the arms, forearms and hands, as well as of the legs from the ankles to the knees ; in some cases the anæsthesia is more, in others less extensive. The patient knows all that is going on around him, but takes no apparent notice.

Hallucinations of hearing may arise in this condition.

The flow of thought is slow, in contradistinction to the ' flight of ideas ' of the acute stage. If undisturbed, the patient sits silently in the same position all day long. There is neither rigidity, flaccidity nor flexibilitas cerea. If the patient's arm be raised by the doctor to some unusual position, he quietly returns it to the comfortable posture from which it was removed. He is unemotional and his more lately acquired instincts are in abeyance. The memory is fairly good.

In a few cases this post-maniacal condition of stupor becomes exaggerated and persistent, and it assumes the characteristics of anergic stupor to be presently described. Usually, however, in the course of a few weeks, the stupor gradually passes off and the patient enters the stage of convalescence. The skin becomes clear and the flesh firm, the body-weight increases, the appetite returns and all the organs begin to function normally.

Complete recovery usually takes place within a few months; but it must not be forgotten that in some patients a state of melancholia supervenes.

Simple mania is a milder condition, similar to that which occurs to a slight degree in most normal individuals about the seventeenth year, when a boy begins to feel that he is a man and that the world lies at his feet. He goes to the University feeling confident that he will be able to take all the degrees it offers, and any remonstrance on the part of his parents is regarded as nonsensical interference. When this feeling gets out of hand the boy becomes a simple maniac. He buys a revolver in order to retaliate against any parental interference, becomes engaged to many girls, drinks whisky and shaves his hairless face so as to be a man. One patient sawed off the corner of the dining-room table because it was in his way. The simple maniac pays unusual attention to his dress, which is extravagant; he wears flowers in his buttonhole and uses scent. He is garrulous, boastful, argumentative and at times brilliant in repartee. His memory is quite accurate. His emotions are excessive, he is either exuberantly jovial or extremely irritable.

Although the above condition happens most characteristically during the period of adolescence, it may occur at any time of life. The author has seen one case at the age of fifty-two, and many during the fifth decade.

Acute delirious mania is a phase of intermittent insanity in which all the characteristics of acute mania are excessive and there are, furthermore, physical signs of an acute febrile disturbance. The temperature is raised, commonly to 101° F., sometimes to 103° F.; sordes appears on the lips, teeth and tongue, which latter is coated with a thick brown fur; the pulse-rate is perhaps 140 to 150 and the respiration 30 to 35. Complete insomnia and absolute constipation are the rule. The patient refuses food and is frequently unable to retain any nourishment or medicine administered by means of the feeding-tube.

Chronic mania presents the same symptoms as acute mania; but it differs in that the condition does not pass away, the patient remaining permanently in a state somewhat resembling the stadium acutum above described. Further, the symptoms are less marked than in acute mania. In chronic mania we sometimes meet a remarkable exaltation of memory (hypermnesia). One patient, who was in Bethlem for some years, could always remember the

name of any medical man who had visited the wards, perhaps years previously, although Bethlem is an institution visited by a large number of medical men in the course of a year.

Chronic maniacs are liable to acute exacerbations from time to time, each of which leaves the patient more weak-minded. The memory gradually fails. The above patient, indeed, reached a stage in which he failed to recognize former Bethlem house-physicians whom he had at one time seen daily for six months.

Prognosis.—The outlook in all cases of acute and simple mania is, as a rule, favourable for the existing attack. A few cases of acute mania die of exhaustion from the disease or from some intercurrent complication, and a still smaller number become transformed into a condition of chronic mania. The duration of most cases of acute and simple mania is from five to seven months, but it may be as short as a fortnight or as long as two years. If the patient has had a previous attack the physician will, as a general rule, do well to be guided in his prognosis by the duration of that attack.

The prognosis of chronic mania is bad as regards recovery but good as regards life. The author has, however, seen a few cases of chronic mania recover, one after about five years' illness.

It has been said that about 50 per cent. of cases of acute delirious mania die of exhaustion from the disease and that a considerable proportion of the remainder become permanently weak-minded. This is certainly not the experience of the author, who regards these cases more favourably. A considerable number have already entered upon convalescence within a month if they have been energetically treated. About 25 per cent. die of exhaustion and the author is now of opinion that some of these might possibly be saved. He has seen but one case that became permanently weak-minded.

Treatment.—When first, some years ago, I approached the study of mental disease it was a great surprise and somewhat of a shock to me to find that wan and emaciated patients in a state of acute excitement were allowed to spend their days dancing round the gardens of institutions for the insane, save when their motor excitement proved too much for the other patients, when they were allowed to perform their wild gyrations within the confines of a padded room. On inquiry I was told that it was better to let them 'have it out', so I subscribed to existing doctrines and many a time satisfied my desire to do some real

good in the world by disturbing a quiescent maniac and setting him to take a run round the garden.

True it was difficult to discover the rationale of such treatment ; but conscience could always be salved by the shibboleth, 'Vis medicatrix naturæ'. But now, after years of experience and repeated observation of the results of Continental methods, I am constrained to dissent from the traditions of this country and to advocate as the essential principle of treatment of acute maniacal states what our forefathers would have stigmatized and some of the senior members of our branch of the medical profession still stigmatize as a heresy—rest ! rest in bed !

I admit that it is no easy matter to get an acute maniac to rest in bed ; but the difficulty is not insuperable. In many cases a tactful attendant is all that is required ; his duty is to induce the patient to remain in bed, not to hold him there, for it is no rest to be held down.

If other measures fail, a course of prolonged baths should be tried. The use of such baths has been in vogue since the days of Pinel and many have been the modes of application. The outcome of experience is that the following is the best.

The temperature of the bath should be 96° to 98° F. On the first day the patient remains in the bath for half an hour ; on the second day, one hour ; third day, two hours ; fourth day, three hours, and so on up to six or seven hours a day. It is not known how the bath acts, but its effect is that the patient gradually becomes more and more restful. He enjoys the bath ; he may at first be somewhat restless and turn somersaults in it. Should this activity become at all excessive, he can soon be dissuaded from it by a sympathetic attendant, who should never leave the bath-room. In time, the soothing effect of the warmth, or the pressure of water, whatever it may be, begins to tell, and the patient sinks into a state of quietude. After the bath he should return to bed and be persuaded to remain there as much as possible. Females undergoing the treatment should wear a gown of some sort or a chemise.

When it is decided that the course has done its work the duration of the bath should be gradually diminished. Bed treatment should then be substituted, perhaps with the addition at first of a daily bath of one hour's duration.

As soon as quietude is restored the patient may sit up half an hour twice a day for a smoke ; but he should not be allowed to

play exciting or exhausting games. As he improves, this half-hour may be gradually prolonged and he may be allowed to perform light duties about the room or ward.

Meanwhile the patient must have abundant nourishment. He should take in addition to his ordinary food 3 pints of milk, at times with cream, and he should have a plentiful supply of biscuits while undergoing the bath treatment. A glass of stout or port with dinner and supper may serve as an appetizer and as nourishment; but alcohol must, of course, be withheld if it has played a rôle in the causation of the disorder.

If, as in some cases, there should be absolute refusal of nourishment, the patient must be tube-fed. Tube-feeding lasts rarely more than a few days in the case of a maniacal patient. If undigested food from the last meal should be returned up the tube, this should be taken as an indication for subsequent meals to be peptonized.

The only drugs which are indicated in the treatment of acute maniacal states uncomplicated by intercurrent disease are motor sedatives and hypnotics. Sulphonal serves the purpose of both and may be regarded as almost a specific for acute mania. The dose, which should be administered every night, is 30 grains for a man, 20 grains for a woman.

Sulphonal rarely acts on the first night, but after about three doses its effect begins to be noticeable; there is more sleep during the night and less motor activity during the day. Isopral is a milder drug of the same nature, which often acts beneficially; the dose is 30 to 40 grains for these patients. It should be dissolved in water.

Amylene hydrate is a satisfactory hypnotic in these cases and hydrobromate of hyoscine, $\frac{1}{100}$ grain three times a day by the mouth, frequently serves as a useful motor sedative.

The action of the bowels should be regulated on ordinary medicinal principles.

Acute delirious mania is a condition which demands special consideration, because it is liable to resist all the ordinary methods of treatment. The patient gets no sleep in spite of drachm doses of sulphonal; he refuses all nourishment and if he is forcibly fed with even a small quantity of liquid food his stomach rejects it; he is constipated, no aperient can be administered and it is impossible for the attendants to give him an enema. What is to be done?

Chloroform is our sheet-anchor in this condition. The patient is anæsthetized and the rectum cleared, either digitally or by means of an enema. His temperature is taken, he is washed with warm water and soap and changed into comfortable clothing. While he is deeply under the anæsthetic a tube is passed into the stomach, which is then washed out with a dilute solution of carbonate of soda, followed by warm water. A feed is then administered consisting of 1 pint of milk, 2 ounces of cream, 2 ounces of white mixture and 40 grains of sulphonal. The patient is made comfortable in bed and the anæsthetic continued carefully for another hour. He is not aroused from the anæsthetic, but is carefully watched until his sleep is apparently natural. He is then left in quietude. The sleep continues for many hours; he wakes up refreshed and makes a fairly rapid recovery. Although the author's experience of this method of treatment is limited to two cases, the beneficial results were so striking that he has no hesitation in warmly recommending the method as a routine treatment for obstinate cases of acute delirious mania. In each of the cases the patient's life was undoubtedly saved by the adoption of this method.

Chronic mania calls for no special treatment except during an acute exacerbation, which should be treated like an ordinary case of acute mania. In a county asylum a fair amount of unskilled labour can be obtained from these patients.

Anergic Stupor.

Anergic stupor is a phase of intermittent insanity in which the patient is neither excited nor depressed, but apathetic, lethargic and torpid. The condition is rare. It may be primary in its origin; more frequently it develops from melancholiac stupor or from post-maniacal stupor.

Physical Signs.—The patients are, as a rule, in poor physical health and ill-nourished. Except for an occasional excess of secretion of sweat about the face, there appears to be little disturbance of the cutaneous secretions; but the complexion is, as a rule, sallow. The temperature in many cases is subnormal. The pulse is slightly increased in frequency and of low tension; the respiration normal in frequency but shallow. The extremities are nearly always cold and, at least in cold weather, blue, swollen and œdematous. In some cases in which there is

marked œdema of the hands and feet, some œdema may also be observed in the face, especially about the nose and lips.

There is little evidence of disturbed digestion, but the patients are invariably constipated. The urine is deficient in quantity, high-coloured and contains traces of indoxyl. In females amenorrhœa is the rule.

The patients do not suffer from headache, pain or subjective sensations of any kind and there are no local paralyses. There is well-marked peripheral anæsthesia.

There is no rigidity or flexibilitas cerea ; the limbs are flaccid. If the arm be raised and allowed to fall, it ' flops ' down to the patient's side. Similarly if the leg be raised, it falls to

FIG. 46.—HYPOTONIA IN ANERGIC STUPOR.

the ground like a log. In severe examples flaccidity of the trunk may sometimes be observed. The patient lies in bed in any position in which he is placed, for all the world like a rag doll. There is hypotonia or atonia as shown in Fig. 46 : this patient, if placed in the attitude there represented, would remain in it for hours together. There is no laxity of the ligaments ; it is impossible, for example, to hyperextend the fingers.

The superficial reflexes are diminished, the plantar reflex being accompanied by a flexor response of the great toe. The tendon reflexes are increased. A tap on the patellar tendon elicits a knee-jerk of large excursion, rapidly followed by a brisk contraction of the semimembranosus.

There is almost complete absence of movement, the patient remaining in any position in which he is placed. Similarly speech is absent; at most, the patient replies in monosyllables. The electrical reactions of the muscles are normal.

Mental Symptoms.—In view of the extensive anæsthesia which occurs in most of these cases, it is not surprising to find that consciousness is at a low ebb. Of ideation there seems to be none; and, in some cases at least, the same may be said of perception, for Clouston mentions the case of a female patient who took no notice of another patient committing suicide by hanging herself before her very eyes. We may therefore accept the statement of stuporose patients after recovery that they do not experience hallucinations or illusions during the course of their illness.

If there is no perception there can be no emotion, for emotion is essentially a reaction to a percept; nor can there be any instinct; in the majority of these cases instinctive movement is absent as well as volitional. The instinct to eat is lost. If a plate of food be placed before the patient, he takes no notice of it and, if left to himself, would starve. He has to be fed and dressed by the attendants. Nevertheless, in mild cases of anergic stupor the patients will dress themselves, and females may do their own hair. Some will also take the trouble to visit the water-closet when necessary, but the majority are wet and dirty.

Again, if there be no perception, there can be no memory. Accordingly we find that most of these stuporose patients on recovery have no memory of the major part of their illness. To them it is an absolute blank.

It is difficult to ascertain how much they sleep. They lie quietly in bed the whole night through and it would be most unwise to disturb them in any way for the purpose of determining whether they are asleep, lest this should arouse them from slumber. It is also difficult to decide how much their stuporose condition serves the purposes of sleep and how much true sleep they really require.

Delusions do not arise during the course of anergic stupor; but a few patients subsequently develop delusions as to the nature of their illness. For example, one patient thought that she must have been hypnotized by some person or persons unknown.

Anergic stupor lasts from three months to three years according to the severity of the case. Although treatment may modify the course of the disease, many cases last from two to three years in spite of the most generous and energetic methods.

When the stupor is about to pass off the patient's instincts return gradually to their normal condition. He begins to eat of his own accord, becomes clean in his habits and takes some interest in his personal appearance and surroundings. He moves about, holds conversation with others and the mental condition becomes clear. As a rule, there is a slight reaction after the prolonged period of quiescence and the patient has an attack of mild excitement lasting a few weeks.

Prognosis.—The prognosis in cases of anergic stupor is good, and the recovery, as a rule, complete. A few cases terminate in a short, sharp attack of acute mania or melancholia. It is regrettable that a small number of patients who are unfortunate enough to get into the hands of persons, even medical men, unskilled in the treatment of such cases, die of inanition.

Treatment.—It must be at once understood that it is useless to attempt to ' rouse ' these patients. It would be as reasonable to treat a case of toxic amblyopia by sending him to view the pictures in the Academy as to treat a case of anergic stupor by sending him holiday-making in the country or globe-trotting. The proper treatment of anergic stupor is rest in bed and a generous diet. The ' gospel of fatness ' applies to this as to all forms of insanity. Tube-feeding is rarely required, but it is almost always necessary for the attendants to administer every meal for months together by means of a spoon or feeding-cup. The minimum daily diet should be 4 pints of milk, 4 eggs and 4 ounces of cream. This may be varied occasionally with bread soaked in some nourishing soup (not a meat extract) and milk puddings.

If it can be definitely ascertained that the patient gets insufficient sleep, a couple of drachms of paraldehyde nightly can do no harm and will probably do much good.

General massage for an hour daily helps to increase nutrition and, when the patient has put on a considerable amount of flesh, an attempt may be made to restore sensibility to the anæsthetic limbs by the daily use of an electrical wire-brush and cold baths.

When the patient has acquired a good covering of fat he may be allowed to get up regularly at midday. He should not be allowed to rise earlier until there are definite signs of the illness drawing to a close.

Terminal Dementia.

As already stated, periodic insanity tends but little to dementia. Intermittent insanity, on the other hand, tends to dementia to such an extent that it may be taken as a fairly constant rule that the sixth attack leaves the patient so weak-minded that he is no longer capable of managing himself or his affairs, and for ever

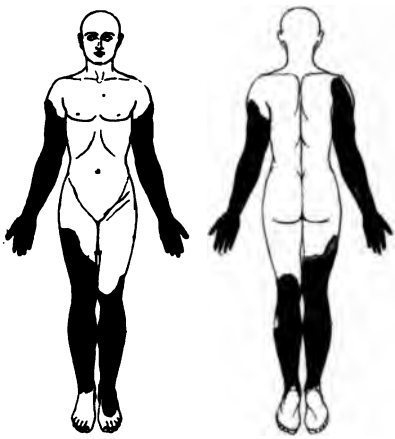


Fig. 47.—Anæsthesia in a Case of Terminal Dementia of Intermittent Insanity.

afterwards requires permanent care, usually in an asylum. Each attack leaves him more weak-minded, the condition subsisting between the earlier attacks being known as ' partial dementia '.

In partial dementia the most recently acquired mental functions show signs of degeneration. Some deficiency of reasoning power is manifest in the patient's conversation ; the formerly ardent Conservative may become, for example, a rank Socialist. Voluntary attention cannot be sustained as well as it used to be ; duties are neglected and the man's attention is more likely to be dominated by his instincts. In some cases this latter characteristic may land the patient in gaol since the legal mind is mostly incapable of recognizing partial dementia. There is

deficient control of the emotions, and outbursts of anger are common. The memory shows signs of failure, especially inability to recall proper names and to remember recent events.

In the terminal stage, after some dozen attacks or more, the mind is completely lost. There is peripheral anæsthesia, more or less extensive. The man is incapable of recognizing his friends or of apprehending the nature of his surroundings. He has no idea of time and his memory becomes a blank. His instincts and desires are gone; he has no idea of feeding himself and consequently he requires to be spoon-fed. He is periodically wet and dirty and therefore, unless carefully tended, liable to bedsores. His attention cannot be aroused; he can understand nothing that is said to him, and there is no attempt at speech. Lastly, he may be bedridden and incapable of any but reflex movement.

All physical signs of the acute stages of the disease have, as a rule, disappeared by the time the patients reach this terminal condition. Their muddy complexion may give them a generally unhealthy appearance, but they are not especially liable to contract disease, except perhaps phthisis. As a rule, therefore, they live to old age. On the other hand, their power of overcoming and surviving any intercurrent disease is small and their general vitality is so low that the most trivial malady is likely to lead to a fatal termination.

Pathology of Intermittent and Periodic Insanities.

Post-mortem examinations and the microscope have failed alike to throw any light on the nature of these diseases. In some cases of long standing the weight of the brain is slightly less than normal and there is some excess of cerebro-spinal fluid. On microscopical examination it is found that there is slight chromatolysis of the largest cells of the cortex, but scarcely more than may be found in the brains of patients dying from some thoracic or abdominal disease in a general hospital.

Accordingly many theories have been advanced as to the essential nature of intermittent insanity, most of which take little or no cognizance of the brain being the organ at fault. Some writers have claimed that indigestion is the cause of the disease, others fix on constipation; others again blame the kidneys and Craig attributes the disease to alterations in the blood-pressure.

Most writers seek to explain the phenomena of intermittent insanity by some toxic process. With these the present writer is disposed to agree; but he differs from them in supposing the essential toxins to be primarily within the neurons and not primarily in the general circulation.

The toxins absorbed from a distended colon are those which are usually blamed for intermittent insanity; but surely if this were the cause we should require at least ten times as much asylum accommodation as we have at present in this country. On the other hand, the number of cases of intermittent insanity in which the incidence of an attack is directly traceable to some mental shock is, in the author's experience, sufficiently large to justify the supposition that the physical basis of the disease is primarily situated in the cerebral cortex. Further, intermittent insanity is hereditarily related to diseases of the nervous system, not to diseases of the bowel.

The author bases his theory of intraneuronic intoxication on the supposition, first originated by Hughlings Jackson, that the slow movements of the large proximal joints are dependent on the activity of the larger nerve-cells of the motor cortex, while the rapid movements of small peripheral joints are dependent on the activity of the smaller nerve-cells of the motor cortex.

Now the nutrition of a cell may be disturbed in one or more of four different ways: (1) The cell may contain an irritating stimulating body, (2) may contain a paralysing body, (3) the plasma surrounding the cell may contain an irritating body and (4) the plasma surrounding the cell may contain a paralysing body. Now it is to be observed that, with regard to their cubical content, small bodies have large relative surface, and large bodies have small relative surface. The large cells of the cortex representing proximal movements have a smaller relative surface than the small nerve-cells representing peripheral movements. Let us now consider how these cells would be relatively affected by the four above-mentioned conditions of disturbed nutrition. If an irritating, stimulating product were formed within the cortical neurons the result would be general motor activity affecting the proximal movements most; because the large nerve-cells, in which proximal movements are represented, have a relatively small surface by which they may get rid of the deleterious substance, while the small cells would readily excrete it from their relatively large surface. If, on the other hand, a

paralysing product were formed within the cortical neurons, the result would be weakness or paralysis affecting the proximal movements most, for similar reasons. The same argument applies if the depressing influence within the nerve-cell be deficiency of nutrient material (trophoplasm); the large cells again suffer most, because they have a smaller relative surface by which they may absorb nutrient matter from the surrounding plasma. If the surrounding plasma contained an irritating stimulating body, there would result a general motor activity affecting the peripheral movements most; because the small cortical nerve-cells, representing peripheral movements, have a larger relative surface exposed to the deleterious influence than the large cells. And lastly, for similar reasons, if the plasma contained a paralysing body or its equivalent (deficiency of normal nutritive and stimulating bodies), there would result a paralysis affecting the peripheral movements most.

The first condition (general motor activity affecting the proximal movements most) is that which occurs in mania. The second condition (proximal weakness or paralysis) occurs in melancholia, notably in melancholiac stupor. The third condition (peripheral activity) is met with in most cases of agitated melancholia and is also, in cases complicated by exhaustion symptoms, superimposed in mania upon the typical proximal activity. The fourth condition (peripheral weakness) is rarely, if at all, met with in cases of insanity, except as a result of coarse brain disease.

The above considerations appear to suggest the following conclusions: (1) That, in mania, an irritating product is formed within the cortical neurons. This view is further supported by the 'flight of ideas' in mania. (2) That, in melancholia, a paralysing product is formed within the cortical neurons. (3) That, in agitated melancholia, there is a combination of deleterious influences, viz., a paralysing product within the cortical neurons and also an irritating body in the plasma bathing the nerve-cell. (4) And that, in a few cases of mania, there is, in addition to the irritating body within the nerve-cell, an irritating body in the plasma bathing the nerve-cell. Whether we are to infer from the above considerations a new formation of cytotoxins or an increased formation or deficient elimination of substances normally occurring in the organism, there is at present no evidence to show; but, as regards melancholia, it is

well to bear in mind that in that disease there is a general tendency on the part of the cells, throughout the organism, to fail in the excretion of their normal metabolic products.

It may be asked, If the pyramidal system is involved in melancholia, why do we never obtain Babinski's extensor response in that disorder? The reason is not far to seek. It is simply because that part of the motor nervous system which controls the movements of the great toe, a peripheral portion of the limb, is, as we have seen, not affected by the paralysis of melancholia.

The rigidity of melancholia will be best explained after reference to the experiment of the decerebrate cat. If the crura cerebri of a cat be divided, the animal passes into a condition of intense rigidity of universal distribution so that it can be stood on its four legs like a chair. If now the cerebellum be raised and the pons divided from behind forwards to the depth of about a quarter of an inch, but not deep enough to affect the pyramidal tracts, the animal falls completely flaccid, as if it were made of rag. This experiment demonstrates that the rigidity associated with cortical paralysis is due to unopposed impulses passing downwards directly from the pontine nuclei and, it may be presumed, indirectly from the cerebellum.

Now the rigidity of a melancholiac differs from that of a decerebrate cat in degree and distribution, but not in kind. For purposes of comparison, paralysis of certain of the cortical neurons in melancholia may be regarded as equivalent to section of their axons at the level of the crura cerebri, and rigidity of the musculature involved in this paralysis is an inevitable sequel due to the influx of unopposed stimuli from the cerebellum.

The experiment of the decerebrate cat further throws light on the nature of *anergic stupor*. We have seen that the motor condition of that disorder is one of slight universal paralysis with flaccidity, a condition which may be compared to that of a cat in which the crura cerebri and the descending fibres of the pons have both been divided. In other words, anergic stupor is a state in which not only the cortical neurons, but also the cerebellar neurons, are subjected to the influence of an intraneuronic paralysing toxin.

The pathology of the œdema occurring in some of the patients has never been explained, but it seems fairly certain that it is of nervous origin. That it is not due merely to immobility is proved by the fact that there are a large number of chronic dements

who are quite as immobile as a severe case of anergic stupor and yet exhibit no œdema. Further, that it is not due to the passive accumulation of lymph in dependent parts of the organism is proved by its frequent appearance in the face and by the fact that the distribution and intensity of the œdema are but little, if at all, diminished by putting the patient to bed. It is therefore to be inferred that this œdema is due to some action of the nervous system, while under the influence of the acute stage of the disease. In this connection, however, it is well to bear in mind the observation of Agostini that the isotonic power of the blood is diminished in melancholia. This is possibly due to diminution of inorganic salts; but further observations are required.

Pathology of the Delusions.—When once the fact is grasped that melancholia is a special form of paralysis, it is easy to see in what way many of the more common delusions of melancholiacs arise. Although the melancholiac suffers from paralysis, he does not realize the fact; he only knows that he is unable to do things which formerly were easy to him and he naturally begins casting about for a reason for this change. If he comes to the conclusion that his condition is of the nature of an illness, he does not suffer from delusion and is accordingly a case of 'simple melancholia'; but, when the insight is lost, he becomes the subject of some delusion. If he is a spiritualist, if he believes (as most people do) that there is an immaterial spirit pervading the organism, which initiates all his actions but is not 'mind', then, when he finds that he is unable to perform those actions, his natural conclusion is that his soul is lost. Following up this train of thought, he forms the judgment that he is deserted by God, eternally damned and has committed the unpardonable sin. In this frame of mind the patient may fix upon some past peccadillo as the cause of all the mischief; or, by an illusion of memory, may even accuse himself falsely of some dreadful crime, *e.g.*, of having swindled his firm. Other patients, animists, starting with the same premise, regard their inactivity as a loss of 'vital' energy, and so conclude that they are dead. Others again, with less definite ideas, at first merely believe that they are altered in some way; these patients subsequently may develop most grotesque delusions about the nature of the change. For example, one female patient at Bethlem came to the conclusion that she was a chicken.

At first she merely thought she was changed, but one morning two of the symptoms of melancholia forced themselves upon her, and she there and then concluded that she was a chicken. These symptoms were (1) the harsh dryness of the skin and (2) the position of the arms which were rigidly adducted to the side and flexed, a position roughly suggesting that of a chicken's wing. Occasionally the peripheral movement gives rise to a delusion, as in the case of a male patient whose ankle movements were so gross as to give him the feeling of being thrown forwards on his head; hence he developed the delusion that he was upside down. On taking hold of his foot, and asking, 'What is this?' he replied, 'My head.'

With another class (hypochondriacal melancholiacs) the weakness, although general, appears to attract the patients' notice locally. For example, they exaggerate the feebleness of the legs and develop the delusion that they are unable to walk or to stand or that their legs are brittle and made of glass. Other patients of the same class suffering from the epigastric sensation in addition to paralysis get the idea that their breath has all gone or that their bowels are permanently obstructed. The obstinate constipation, caused not only by the weakness of the abdominal muscles but also by lack of intestinal secretions, assists in the development of this last delusion. Closely allied to the delusions of bowel obstruction are such fancies as that of the throat being blocked up and the food going into the head.

In all the above cases the patient merely takes account of his own weakness and blames nobody but himself for his condition. If, however, he is normally of a suspicious nature, he is apt to ascribe his condition, not to his own weakness, but to the increase of resistance in his environment. Hence arise all kinds of delusions of persecution. Some such patients believe themselves to have been transformed by their foes by means of an occult influence such as hypnotism.

The delusions of exaltation associated with mania arise in a similar manner from the feeling of activity which results from the stimulation of the cortical neurons. The maniac during an attack of motor excitement feels strong and capable of wonderful athletic feats. Hence results a sense of power, and the patient develops the delusion that he is a duke, lord, king or God, or that he is possessed of untold wealth.

Remarks on the General Management of Intermittent and Periodic Insanities.

We have seen that the characteristic of these insanities is a tendency to recurrent attacks of mental disorder, each attack resembling the last in character and duration, and the problem arises whether it is possible to avert them. To a certain extent it is. The patient should lead a regular life, should take care to have plenty of sleep and nourishment and avoid exciting and worrying pursuits. Many of these patients would never come under observation at all if they had a thousand a year of their own and expended it properly.

A patient who has once had an attack of the kind described in this chapter should for ever afterwards be weighed once a month. If he has lost a pound in weight, he should at once set to work to put it on again by allowing himself a couple of pints of extra milk each day. If this is insufficient, he should take extra rest, preferably by going to bed for a few days. Sleeplessness can often be averted by taking a glass of hot milk and a few biscuits on retiring for the night. The author is disposed to think that a vegetarian diet is more suitable for these patients than a meat diet; not that the diet should be exclusively vegetarian, but that the amount of meat should be limited.

In cases of periodic insanity wherein the patient breaks down at a given time of year in spite of all precautions, it is often beneficial to have an entire change of scene and surroundings a couple of months before the expected attack. If the patient lives in the country, let him take to a town life, and *vice versâ*; or let him live in a hydropathic establishment, where the regular life is especially beneficial to neuropaths.

Above all things it must be remembered that the nature of this disease is such that the patient must make up his mind to be somewhat of a valetudinarian, ever watchful for prodromal symptoms, ever careful of his physical health and ever mindful of his last attack, even after twenty or thirty years have gone by.

The medical man is frequently consulted as to the advisability of marriage in these cases, and unfortunately there is a popular delusion that marriage acts beneficially on neuropaths. It is an obligation upon the medical man to combat this to his utmost, not only on account of his duty to the State to prevent, as far as lies in his power, the procreation of neuropathic children,

but also in consideration of the patient. Only those behind the scenes can have any idea of the ruin, misery and want entailed by the marriage of neuropaths. I quote two cases :

1. Husband, a dement in an asylum. Son, a ne'er-do-well (partial dementia after acute mania). Two daughters, typical alternating insanity, kept at home or occasionally sent to asylum. Wife keeps the home together. Daughter earns enough to help mother in doing this and to keep father out of a county asylum.

2. Wife, a nagging dement at home, the husband being unable to afford the means to keep her in a private asylum. Wife's brother in an asylum, paid for by husband. Two daughters in an asylum. Daughter died in an asylum. Son, a ne'er-do-well (partial dementia). Husband a bankrupt but, having a sound nervous system, sane.

CHAPTER IV.

THE EXHAUSTION PSYCHOSIS.

(ACUTE CONFUSIONAL INSANITY).

In the earlier part of this volume it was stated that there are certain individuals who, when they become fatigued, suffer from a train of exhaustion symptoms, exhaustion being pathological fatigue. Should such persons suffer from mental disease, it tends to fall into line with the type now under consideration.

The mental disorders here described arise, in predisposed individuals, as a result of intoxication of the cerebral cortex by the toxins of certain fevers, such as influenza, rheumatism, typhoid, scarlet fever and septicæmia; intoxication by products of fatigue, which are created by excessive mental or physical exertion, worry, anxiety and fright, and as a result of malnutrition of the cortex, due to inanition, anæmia or profuse hæmorrhage. Childbirth is a frequent cause of the disorder since it may lead to exhaustion, hæmorrhage or septicæmia; the psychosis may also be caused by prolonged lactation.

The student will note the similarity between these psychoses and the intoxication psychoses hereinafter described.

Physical Signs.—From the beginning of the disorder the patients look ill. Their complexion is pale and muddy. In depressed cases the skin tends to be abnormally dry, in excited cases greasy. In all, there appears to be a special proclivity to seborrhœa sicca of the scalp.

The general nutrition is poor. The patients lose weight and, on admission to hospital, are frequently emaciated. The temperature is commonly subnormal.

There is almost invariably a slight chlorosis. The pulse is soft and the arterial tension low, even in the depressed cases; the pulse-rate is normal or only very slightly increased. The urine

is scanty and of high specific gravity ; it may contain a trace of albumin.

As a rule, there is little or no diminution of muscular power. Yet a few patients are physically weak and show tremor of the fingers.

The superficial reflexes are normal except in depressed patients, in whom they are diminished. The tendon reflexes are increased, the knee-jerk being usually characterized by large excursion and inactive return. The organic reflexes are unaffected.

The pupils are widely dilated, but react well to light and contract on convergence. Nystagmoid jerking is commonly seen on extreme lateral deviation of the eyes.

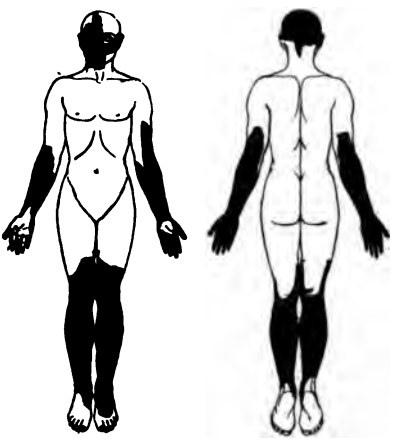


FIG. 48.—ANÆSTHESIA IN A CASE OF ACUTE CONFUSIONAL INSANITY.

Mental Symptoms.—Peripheral anæsthesia is invariably present during the early stages of the disease, is one of the cardinal symptoms and persists usually for a fortnight or more after the patient comes under treatment. Anæsthesia does not occur, however, in some of the post-febrile cases. Contraction of the visual fields may be sometimes observed ; possibly it is a constant symptom, but I have not been able to determine satisfactorily whether it is present in all cases.

There is great disturbance of the functions of perception, cognition and recognition. Imperception occurs. If the patient be shown a picture, he is unable to say what it portrays. Of course, the complexity of the picture necessary to elicit this

symptom varies with different patients. Similarly the patient may not be able to understand the import of a more or less complex spoken sentence.

Perceptual or ideational inertia is common. If the patient be shown a series of objects, he may recognize the first one and name it correctly, but give all succeeding objects the same name (vide p. 106).

Hallucinations are a cardinal symptom. Commonly they are of all the senses. The patients see in the air moving faces, devils or flying insects, hear voices or other sounds ; sometimes they catch imaginary insects with their hands and evidently feel them between their fingers ; they feel beetles crawling over them, smell chloroform in the bedclothes and taste poison in their food. Illusions of identity occur and the officials of the institution are mistaken for relatives or enemies.

The patients are incapable of apprehending the nature of their surroundings. This again is a characteristic symptom of the disorder. Patients are, at least in severe cases, completely disorientated. Even in mild cases, they are liable to lose themselves in formerly well-known surroundings.

The memory is greatly disordered. Most of these patients have no idea how long they have been in hospital and women who have been married for years will only answer to their maiden name. On recovery it is found that a great part of the patient's illness is forgotten and remains a mere blank, a scotoma in his life.

This extensive disturbance of the perceptive faculties leads to disorder of judgment, and delusions arise. The patient refuses to accept the reality of things. The hospital is a church, monastery or theatre. Although in his own room and bed, he believes that he has been transferred elsewhere and that an elaborate attempt has been made to make the place resemble his own room. The flowers in the room are artificial ; the newspapers are not brought from the outside world, but printed on the premises for purposes of deceit, the news therein being false. One patient, whom I allowed to examine my camera minutely, refused to believe that it was a real one. Others believe that their children are being tortured, for they can hear them screaming ; that they themselves are to be done to death, for they see cartloads of bodies taken away every night ; or that certain relatives are dead, for they have been present at the inquest. Expansive delusions occur in a few cases.

The emotional attitude differs in different cases. The majority of these patients are depressed. Many are cheerful, abnormally hilarious and mirthful. Emotional reaction is excessive in most cases, the patients being irritable and liable to outbursts of laughter, anger or depression associated with a flood of tears. A few stuporose patients, on the other hand, appear to be completely apathetic.

Instinctive action is uncontrolled. In many cases the peripheral anæsthesia allows the pelvic area to dominate consciousness, the patients then becoming erotic or taking to masturbation, thus exhausting themselves further and rendering their case incurable. A few patients, especially males, collect rubbish. Destructiveness is common, the bedding and clothing being frequently torn to pieces.

On the other hand, the instincts are often in abeyance to such an extent that the patient is wet and dirty in habit. He spits, throws food about and smears his room with fæces.

Motor restlessness is the rule, especially during the first month of the illness, so that the patients have to be nursed in a padded room. Excited cases lie on the floor and pound it with their heels and fists, or stand hammering with their closed fists on the walls or door. Depressed patients wander about aimlessly in a dazed condition, perhaps pulling out their hair ; or they lie quietly but rigidly in bed gazing at the hallucinatory forms about the room. Others again curl themselves up in a corner under bedclothes or inside their nightdress and remain motionless for hours together. Most of them resist all attentions, refuse food and require to be fed with a tube.

The movements are slow and performed without any definite aim, thus differing from the characteristic movements of acute mania, which are quick and commonly performed for some mischievous purpose.

Agnostic and ideomotor apraxia occur, often with ideational inertia or 'perseveration'. The patient is shown a fountain-pen; he pulls the end off. He is now shown a knife; he tries to separate it in the same way into two parts by pulling at the two ends. The same occurs with a match-box, and so forth.

Volition being in abeyance, voluntary attention is impossible. Instinctive attention, on the other hand, is easily roused in some cases and the patient's thought can be diverted by merely holding a watch, bunch of keys or other object within his field

of vision. Of course, by reason of his imperception he may fail to grasp the full meaning and content of the percept which one endeavours thus to induce.

On account of the lack of voluntary attention the speech is incoherent. In severe cases it may consist entirely of disjointed words and phrases. Rhyming incoherence is occasionally heard. A certain amount of garrulity occurs in some of the excited cases, but noisiness and shouting are rather exceptional.

No attempt at letter-writing is made during the earlier stages of the disease. Later, when improvement develops, the patient's first letters give evidence of mental confusion. He may start fairly well; gradually, as mental confusion supervenes, the same sentences are repeated over and over again (ideational inertia) and the letter may end in a series of disjointed phrases. The calligraphy is puerile, mistakes in spelling occur and blots are a frequent accompaniment.

Sleep is poor and occupies but a few short periods during the earlier hours of the night.

The acute stage of the disease lasts about three months, at the end of which time it is found that sleep has improved under treatment and that anæsthesia has disappeared. The motor restlessness tends to decrease, but persists with occasional remissions for four or five months. During this time perception improves, the patient gradually becomes orientated and the hallucinations and delusions disappear. Even at this stage emotional outbursts are liable to arise and the patient is easily confused and may be incoherent in conversation. These symptoms, however, disappear during the next six months as the patient rapidly puts on flesh. Even during convalescence fatigue is easily induced and undue exercise is liable to bring about a relapse.

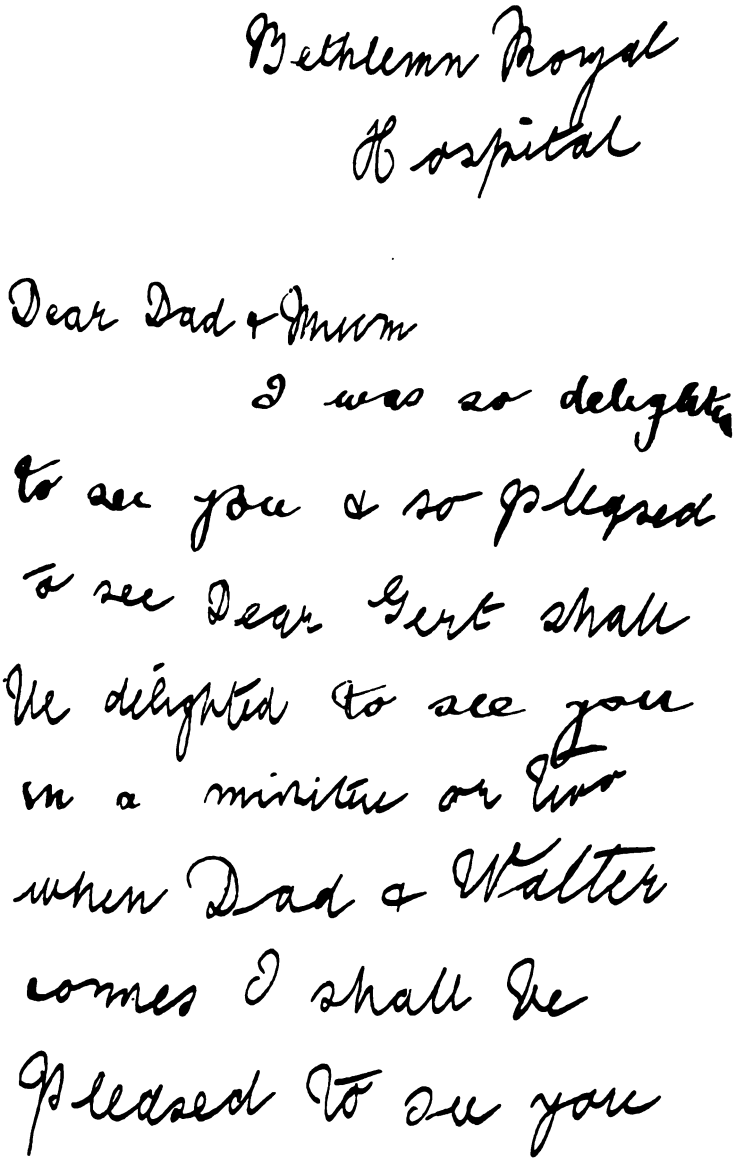
Varieties.—At least five varieties may be recognized:

1. The depressive form associated with motor restlessness. This is the commonest variety.

2. The excited form in which the patients are happy, hilarious, sometimes exalted and always in a state of motor excitement.

3. The stuporose form in which the patient remains quiet and rigid, the rigidity affecting all the muscles of the trunk and limbs. These patients usually suffer from terrifying hallucinations and are consequently in a state of extreme depression.

4. Kraepelin distinguishes a separate variety which he calls


Bethlem Royal
Hospital

Dear Dad & Mum

I was so delighted
to see you & so pleased
to see Dear Gert shall
be delighted to see you
in a minute or two
when Dad & Walter
comes I shall be
pleased to see you

FIG. 49.—PART OF A LETTER BY A WELL-EDUCATED PATIENT SUFFERING FROM ACUTE CONFUSIONAL INSANITY.

Note the ideational inertia.

collapse delirium'. This is characterized by the shortness of its duration, since it rarely lasts more than a fortnight or a month.

5. The katatoniac form closely resembling the katatoniac variety of dementia præcox. Such patients present the symptoms of negativism, flexibilitas cerea, echopraxia, echolalia, antics, repetitive movements and verbigeration.

There is an intermittent form of the psychosis, the patient suffering from many attacks in the course of his life. Each attack leaves him more weak-minded and he ends in profound dementia.

Diagnosis.—The above varieties are to be distinguished from melancholia, mania, anergic stupor and dementia præcox by paying due attention to the state of the patient's perceptive powers, orientation and memory. I regard it as the most difficult problem in the diagnosis of mental disease to differentiate between the katatoniac variety of the exhaustion insanity and that of dementia præcox, especially when the patient does not speak and therefore gives no clue as to the state of his perception, orientation and memory. In such cases, the physician has to wait for the development of other symptoms before a diagnosis can be made. In arteriopathic dementia hallucinations do not occur.

Prognosis.—The majority of these patients make a fairly complete recovery in six to twelve months. About 10 per cent. remain permanently demented. Kraepelin puts the duration at four months, the difference being accounted for probably by the fact that bed treatment is more rigidly adhered to on the Continent. The disease occasionally proves fatal.

The best guide to prognosis is the depth of dissolution. Loss of control of the most recently acquired instincts is of minor importance. On the other hand, the prognosis is grave for patients who are destructive and dirty in their habits and for those who during the acute attack lose the instinct for speech and for locomotion.

Pathology and Morbid Anatomy.—While fatigue is an intoxication of the tissues by the paralysing products of muscular metabolism, exhaustion is a process of self-destruction of nervous tissue through its own activity, katabolism being in excess of anabolism. In other words, exhaustion is a morbid process taking place in the cerebral cortex, in which the amount of consumption exceeds that of repair.

Such a condition of affairs can only exist where the supply of nutrient pabulum is deficient. Now the primary nutrient pabulum of the cortical neurons is the intracellular trophoplasm (chromatoplasm) and we learn that histological examination of the brains of patients who have died from the exhaustion psychosis reveals disintegration of the trophoplasm of the cortical neurons. The Nissl granules are deficient and powdery (chromatolysis). There is in addition some staining of the achromatic substance and the nucleus may be eccentric in position (achromatolysis). In some cases there is œdema of the pia-arachnoid and there may be found on microscopical examination diapedesis of leucocytes into the perivascular spaces. It is held that chromatolysis is a recoverable condition, but that achromatolysis means permanent damage to the neuron.

Treatment.—Such considerations as the above must form the basis of all treatment. Cerebral activity must be reduced to a minimum and the supply of nutriment raised to a maximum. In other words, the patient must have plenty of rest and plenty of good nourishing food.

Rest is to be obtained by keeping the patient in bed during the greater part of his illness. If he will not remain in bed, the habit of quietude may often be induced by a preliminary course of prolonged baths.

It is usually necessary to resort to drugs to promote sleep and reduce motor excitement. For this purpose paraldehyde and amylene hydrate are the best, 1½ drachms being administered night and morning. These patients are especially liable to develop symptoms of poisoning if they are treated with sulphonal. Hydrobromide of hyoscine ($\frac{1}{100}$ grain) or liq. morphinæ bimeconatis (½ drachm) three times a day may also be found a useful sedative. It must be remembered that these cases are easily susceptible to fatigue, long after the symptoms have apparently disappeared. It is therefore a great mistake to get the patient up too soon, for this may induce relapse. Most cases require, at the very least, two months' continuous rest in bed. It need scarcely be insisted that restraint should be avoided, especially that most objectionable form, the being 'held down' by nurses.

The diet should at first consist of 3 or 4 pints of milk, enriched by the addition of cream, and four to six eggs daily. The mode of preparation is, of course, to be varied. It may be as

custard or hot bread-and-milk, or the milk may be flavoured with coffee or cocoa. Beef-tea and broth may be given between meals. In cases where the digestion is poor, the feeds may be lightly peptonized. Tube-feeding is frequently necessary and should on no account be shirked. As the appetite improves solid food may be gradually substituted. Alcohol in the form of brandy, port or stout, according to the patient's requirements, is a useful adjuvant. Apart from its stimulating properties, it promotes sleep and improves the appetite.

Iron in some form which does not disturb the digestion is indicated in nearly all cases ; the scale preparations are probably the best for this purpose. Constipation should be treated by the judicious use of purgatives, and intercurrent symptoms dealt with on general medical principles, as they arise. In threatened collapse the physician should resort to copious intravenous injection of normal saline solution.

CHAPTER V.

DEMENTIA PRÆCOX.

DEMENTIA PR.ECOX is a process of mental dissolution, which makes its appearance in persons specially predisposed to this form of insanity, mainly between fifteen and thirty years of age and rapidly leads in the great majority of cases to a profound and characteristic type of dementia. It comprises a very large number of cases, about one-eighth of the admissions to asylums, and it is characterized by a large number of symptoms, many of which may be regarded as being almost pathognomonic of dementia præcox. Its recognition is mainly due to the remarkable clinical acumen of Professor Kraepelin of Munich.

The history of patients suffering from this disorder usually discloses the fact that they come of an insane stock, generally on the maternal side, and frequently that theirs is not the first case of dementia præcox in the family. Nor have signs of mental instability been wanting in the patient : as a rule, he has not done particularly well at school ; he has been seclusive and impulsive, unduly devoted to religious exercises, emotional and easily susceptible to the influence of alcohol. Some cases, on the other hand, have shown considerable mental ability in early life.

Physical stigmata are common, such as deformities of the pinnæ, palate, hair and hands. The author has frequently observed a deformity in the patient's hands, such as assimilated them to those of the apes, especially of the chimpanzee, and to those of the lemurs. The hands are, in many instances, long, thin and delicate, with flattening of the thenar and hypothenar eminences ; the thumb looks more or less forward like the other digits, being rotated outwards instead of looking across the palm. If the terminal phalanx of the thumb be flexed, it may be observed that it fails to undergo the normal amount of internal rotation on the proximal phalanx. This characteristic is also to be

observed in the apes. Another common feature is abnormal laxity of the ligaments of the metacarpo-phalangeal joints so that the fingers can passively be hyperextended, almost to a right angle.

These characteristics, taken in conjunction with the facts that they are sometimes encountered in cases of idiocy, especially those of the Mongol type, that imbeciles are liable to develop at puberty symptoms resembling those of dementia præcox and that the above peculiarities of the hands are

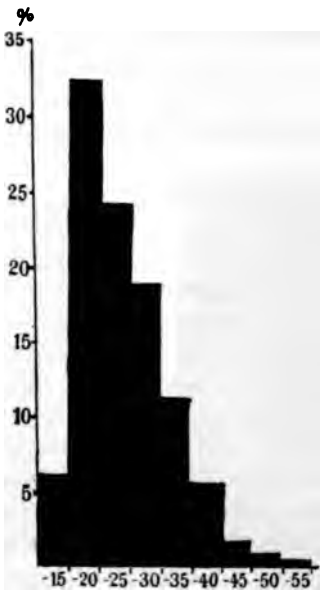


FIG. 50.—AGE-INCIDENCE OF DEMENTIA PRÆCOX (AFTER KRAEPELIN).

also to be observed in the chimpanzee all point to the conclusion that dementia præcox should be regarded as a failure in evolution, as an atavism or reversion to an ancestral type.

Such a view is corroborated by the statements of the parents of many of these patients. Some go so far as to say that there is nothing the matter with the patient, others say that he was always in a somewhat similar condition; and one exceptionally observant and intelligent mother volunteered the remark that no new symptoms had ever developed in her daughter; she had but 'gradually become more and more herself'.

Nevertheless we are bound to admit that atavism does not

entirely account for all the conditions of this disease. The rapidity of the deterioration, the physical ill-health and the possibility of recovery, though rare, all indicate that some active morbid process is at work. Further, Alzheimer has demonstrated that, in certain cases of dementia præcox (katatoniacs), there are isolated areas of gliosis in the deeper layers of the cortex. In view of the fact that the incidence of most of these cases is at the age when the sexual functions are most active, it has been suggested that this disease is due to auto-intoxication by some internal secretions of the ovaries and testes. For the present, then, we may regard dementia præcox as a cortical derangement dependent perhaps on this auto-intoxication in degenerate persons especially predisposed to the disease.

FIG. 51.—SIMIAN HANDS OF DEMENTIA PRÆCOX.

Physical Signs.—At the onset of dementia præcox the patients are found to be in poor health and ill-nourished. The pulse is frequent, sometimes irregular and usually of low tension; in depressed cases the arterial tension is raised. Dr. John Turner of Brentwood Asylum found the blood-pressure raised in 30 per cent., lowered in 30 per cent. and normal in 40 per cent. The skin is often greasy and the complexion sallow. The appetite is poor, the bowels constipated and menstruation is usually in abeyance. In katatoniac stupor the extremities are often cold, the hands are cyanosed, and there may be œdema of the hands, feet and face, especially about the nose and lips.

Dide and Chénais examined the blood of 18 patients. They found the number of polymorphonuclear leucocytes to be dimin-

ished in 5, increased in 4 and normal in 9. Dr. John Turner found hypoleucocytosis in 5 out of 6 cases. Dr. Lewis Bruce, on the other hand, found hyperleucocytosis in all cases of hebephrenia and katatonia; but the polymorphs dropped to 50 per cent. or less in a few incurable cases (sic).

FIG. 52.—ERECTION OF THE HAIR IN DEMENTIA PRÆCOX.

Occipital headache is a common complaint, especially of those patients who suffer from amenorrhœa. The hair is erect, and frequently there is transverse wrinkling of the forehead, which differs from the wrinkling in melancholia in that it is not limited

FIG. 53.—WRINKLING OF THE FOREHEAD AND ERECTION OF THE HAIR IN DEMENTIA PRÆCOX.

This type of wrinkling is of bad prognostic significance and is especially helpful in determining whether a given presenile case is one of chronic katatonia or curable melancholia.

to the centre of the forehead but carried out beyond the supra-orbital ridges, thus causing an expression of surprise or wonder; the wrinkles are also higher on the forehead than in melancholia. The pupils are usually dilated but react well to light. Tremor

of the closed eyelids occurs in some cases. The tendon reflexes may be greatly exaggerated, more than in any other form of insanity. A tap on the patellar tendon causes a knee-jerk of wide excursion, followed by a very brisk return due to contraction of the semimembranosus and, in some katatoniacs, by rectus clonus. The superficial reflexes are normal.

The rigidity, which occurs in some cases of katatonia, differs from that of melancholia in its distribution. In melancholia the rigidity affects the large proximal joints most ; in katatonia the rigidity is uniformly distributed.

All these physical signs are limited to the acute stage of the disease. As a rule they disappear as the patient puts on flesh and becomes restored to good general health.

Mental Symptoms.—Patients suffering from katatoniac stupor have peripheral anæsthesia. In many cases the hands only are anæsthetic ; in others, the loss of sensation involves the whole of the limbs and trunk, with the exception of a small area in the neighbourhood of the external genitalia. Kraepelin believes the lack of response of these patients to a pinprick to be a negativistic sign, the patient simply taking no notice of the prick. The present author contends that there is true anæsthesia, if only for the reason that the loss of sensation has a definite distribution.

Perception and orientation are good. Hallucinations, especially of hearing, occur in the acute stage of the disease, but they may disappear as dementia supervenes. In the majority of cases the hallucinations are, as in most insanities, as vivid as real percepts ; but it is especially in dementia præcox that faint mental images are experienced, which lack the vividness of true hallucination and have accordingly been named, not very happily, pseudo-hallucinations or psychical hallucinations. The patients realize that these faint mental images differ from ordinary thoughts in that they are not referred to the environment, not eccentrically projected.

Cognition and recognition of familiar faces and common objects are quite good, but most of the patients are unable to form a good concept of unusual objects. For example, on the production of a Galton's whistle for purposes of testing a case of dementia præcox, the patient remarked : ' What a pretty thing ! Did you pick it up in the grass ?' At the time we were in a part of a ward whence no grass could be seen, and on the instrument there was no sign of rust to suggest that it might have been lying in a damp place.

Similarly memory is unimpaired, at least for recent events; but it has appeared to the author that the memory for remote events is sometimes confused, because there is occasional incongruity in the patients' statements about events long past. For example, one woman stated that she had been married thirteen years, that her marriage took place in 1895, that her eldest child was born a year after marriage and that he was now eleven years old, the year at that time being 1905.

With such slight impairment of recent memory, cognition and recognition it might be supposed that there is little disturbance of the association of ideas, but this is far from being the case. The majority of these patients display striking poverty of thought; they sit still in the midst of the most fantastic environment and think of nothing.

This apathy to their surroundings is but a part of a general *loss of emotional reaction*. The patients settle down to asylum life without evincing the slightest care or resentment at having been cut off from the outside world; they have no anxiety or fear for the future, no satisfaction or regrets for the past; joy and sorrow, love and anger they know not; and attention is at its lowest ebb.

It is true that some patients vociferously demand, at every visit of the doctors, to be set at liberty; but the request is rather an act of negativism or stereotypy, often initiated by hearing another patient ask for release, than the expression of an emotional desire to go home. One such patient, a lady in Bethlem, used to ask daily to be let out to a workhouse or convent, anywhere, be the surroundings never so objectionable. Another lady makes frequent inquiries as to the whereabouts of her mother, but the inquiries are lacking in emotion and give an onlooker the impression that they are put merely for the purpose of saying something.

Similar remarks are applicable to the *instincts* of patients suffering from dementia præcox. They have no desire for outdoor pursuits, they are not often erotic, they rarely make collections of objects and, when such a collection is made, it is an example of stereotypy; one such patient, for instance, used to stitch useless articles to a piece of flannel.

When they become destructive their destructiveness is an act of negativism rather than blind instinct. They tear their clothing or injure fellow-patients, because they know that they

should not do so. At the same time we have to realize that negativism itself is instinct gone astray.

The most striking feature of dementia præcox is disorder of action.

The **disorders of action**, characteristic of and almost peculiar to this disease, fall under two heads :

(*a*) **Catalepsy,** a state in which there is blind unconditioned obedience to suggestion from without ; and—

FIG. 54.—DEMENTIA PRÆCOX : FLEXIBILITAS CEREA.

(*b*) **Catatonia,*** a state in which acts are performed, not as a final sequel to a play of motives but as a response to some unrecognized purely organic stimuli to which a corresponding psychical state is normally wanting ; in other words, catatonia is a state in which there is blind unconditioned obedience to abnormal stimuli from within.

* I distinguish catatonia, the symptom, from katatonia, the disease, by a difference in spelling.

Catalepsy includes such symptoms as flexibilitas cerea and automatic obedience or imitativeness (echopraxia and echolalia).

Flexibilitas cerea (waxy flexibility) is that condition in which the limbs can be easily moulded into unusual positions and remain in those positions for some considerable time, perhaps half an hour or more. In some cases the limb will remain in a given position for only ten or fifteen seconds ; there is then said to be a *tendency* to flexibilitas cerea.

Echopraxia is that disorder of volition in which the patient imitates any action performed in front of him. If the doctor stands on one leg, the patient does so too ; if the doctor waves his arms in the air, so does the patient. Such an one may also imitate the antic of any other patient near him.

Echolalia is the same symptom in the domain of speech. Whatever is said to the patient he at once repeats ; if he is asked a question, he simply repeats it, with or without a change of pronoun, without giving any answer. If the doctor asks ' How are you to-day ?' the patient replies ' How am I to-day ?'.

There are two varieties of **catatonia**, major and minor.

Catatonia major is a condition in which the patient stands rigidly in the same position from morning till night, provided he is undisturbed. He behaves as a statue, but he is not statuesque. Being unemotional, he does not strike attitudes like a maniac. He stands like a dummy, mucus flowing from his nostrils and saliva drooling from the corners of his mouth.

Catatonia minor includes negativism, stereotypy, verbigeration and the so-called mannerisms of dementia præcox.

Negativism is a state in which any suggestion given to the patient immediately arouses the counter-suggestion. If he be asked to protrude his tongue, he closes his lips firmly ; if the dinner-bell rings, he walks away from the dining-room ; when dinner is over, it may take four attendants to remove him from the room, so active is his resistance ; is it time to go into the garden, it requires four attendants to get him there ; is it time to come in again, it needs four attendants to return him to his ward. At bedtime he has to be undressed by force, and in the morning he has to be dressed again by force ; if an attempt be made to get him to talk, he remains silent ; if told to remain silent, he may respond by shouting down any conversation in the vicinity. Such patients occasionally strip, tear their clothes, break windows and furniture or strike other patients, simply because they are

not wanted to do so. One such patient, on being given a new suit of clothes, was told inadvertently by the attendant not to tear them up : he tore them up immediately. Subsequently he improved and told me he would not have thought of tearing his clothes but for the attendant's suggestion.

Negativism may sometimes be beautifully demonstrated in cases of catatonia major by placing one's hand near that of the patient as if to touch it ; his hand moves away. If now the observer's hand be transferred to the other side of the patient's, the latter moves back again in the opposite direction like a needle repelled by a magnet. In this way the patient's hand may be made to swing to and fro, always moving away from the hand of the observer. Similarly if the observer pretends that he is endeavouring to avoid the patient's hand touching his own, the patient's hand follows his, the former being constantly attracted as if by a magnet.

This symptom is not to be mistaken for obstinacy or resistiveness, such as occurs in resistive melancholia. That negativistic behaviour is accompanied by no disinclination or aversion may be learned from patients who have recovered from the condition. Further, suggestions arise counter to the patient's own wishes as well as to the wishes of others. They will retain their urine and fæces, although it causes them pain to do so. They try to speak, but they cannot get their words out ; all day long a patient may repeat ' I—I—I—I——' trying to say something more, but the something more never comes. This is one form of verbigeration.

The so-called **mannerisms, tricks** or **antics** of dementia præcox appear to be due to systematic dissociation between thought and action ; they are the result of abnormal organic stimuli. Without motive the patient walks up and down the same patch of ground, perhaps holding one arm stiffly and swinging the other. If anyone happens to be temporarily engaged on a portion of his parade-ground, he marks time until the person has moved out of his way ; if he is caught in an unguarded moment in a secluded spot, he is found attempting to stand on his head ; if he is asked to rise from a sitting posture, he does so with stiff legs, without bending his knees ; or he may fall on all-fours from the sitting posture. As he paces the ward, he turns aside to touch objects (one form of ' folie de toucher ') ; he may stand persistently on one leg or hyperextend his trunk till he is able to see the ground a few feet behind him. If asked why he has done any of these

things, he admits that he does not know; at most he will say that it is the Lord's will that such things should happen.

An incident in my own experience throws some light on the nature of these movements. While talking to a female patient suffering from dementia præcox (paranoid form) she shrugged one shoulder. I asked her why she had done so and she replied that she did not know. 'It must have been the underground electricity'. A moment later, unconsciously I crossed one leg

FIG. 55.—KATATONIAC ANTIC.

The patient was accustomed to stand in this attitude and wave one hand.

over the other; she asked me why I had done this. I had no reply; I did not know. I had no reason for the action and the patient informed me that my action, like hers, was due to the underground electricity. From this we may learn that these mannerisms are unconscious, probably instinctive, acts.

Watch a chimpanzee at the Zoo. He turns a somersault, climbs to the top of his cage, swings diagonally across it to a stump of a tree, slides down the stump and arrives at the spot whence he started. Why does he do this? Partly on account

of the blind instinct of locomotion. But why did he take this particular course? The chimpanzee himself could not tell, even if he had the faculty of speech. So it is with the mannerisms of dementia præcox. They are monkey tricks, bearing evidence to the atavistic nature of the disease.

FIG. 56.—HANDSHAKE.
Left—normal. Right—Dementia Præcox.

Mannerisms may also be noted in the speech and writing of these patients. They articulate with unwonted precision, use stilted modes of expressing themselves and converse as if they were making a speech. If one bids them 'Good-morning' at five minutes past twelve, they reply 'Good-afternoon', and they

FIG. 57.—HANDSHAKE OF DEMENTIA PRÆCOX.

correct others in trivial errors of speech. Stilted modes of expression are also used in their letters, which are frequently addressed to great personages, often with the most absurd requests. One patient (an Englishman) used to write to the German Emperor, requesting him to bring the German army

over to England to fetch him out of Bethlem Hospital; another (a Protestant) would write to the Pope, offering himself as a mainstay of the Roman Catholic Church.

One of the most frequently observed mannerisms is the characteristic handshake. The hand is held out stiffly and straight, and frequently the handshake is scarcely over when the hand is rudely withdrawn as if to avoid any expression of cordiality. With hebephreniacs these features may vary from day to day, the handshake being most characteristic when the patient is at his worst.

The calligraphy also is altered: half the words of a letter are underlined; in some letters curious illustrations are profuse and the writing is grotesque in some way or other; for example, it is penned inversely so that it can best be read by the aid of a mirror, or the several letters of each word are superimposed on one another (a form of pseudographia) or they are extravagantly long so that they are best read by turning the page edgewise.

Pseudolalia, another symptom of dementia præcox, is described on p. 139.

Stereotypy is the name given to the repetitive movements of certain of these patients. They perhaps walk continuously over the same patch of grass, round and round in a circle or figure of eight, swing the arms to and fro above their heads for several minutes at a time or, like mechanical toy-soldiers, flex alternately their right and left arm at the elbow.

Verbigeration is the same symptom occurring in the domain of speech. Phrases, sentences or short rhymes are continuously repeated for hours together. The following are some examples which have occurred in the author's experience: 'Will that be all right if I walk up to the door and back again? Will that be all right if I walk up to the door and back again? Will that be all right if I walk up to the door and back again?' and so on *ad infinitum*. 'Our own well, pussy's in the well; who put her in? Put her in ag'in. Our own well, pussy's in the well; who put her in? Put her in ag'in. Our own well, pussy's in the well . . .' and so on. A patient who developed the stereotyped antic of keeping her toes in constant movement while in bed, had the following verbigeration: 'I can't keep on twiddling my toes like this for ever, I can't keep on twiddling my toes like this for ever, I can't keep on . . .' etc., etc.

With some patients only words or syllables are repeated. In

such a case, the verbigeration resembles stuttering or stammering.

The *judgment* is frequently disordered so as to give rise to delusions, especially in patients who are subject to hallucinations.

They may believe themselves to be watched or followed, they may have delusions of persecution or exaltation or accuse themselves wrongfully of past misdeeds. There is, in point of fact, no form of delusion which may not arise in the course of dementia præcox ; but as mental deterioration and physical improvement proceed and the patient becomes an apathetic dement these delusions recede into the background and become forgotten, as do most symptoms of the disease.

To the psychologist dementia præcox is somewhat of a puzzle. So far as the receptive aspects of the mind are concerned, there appears, on the whole, to be little disturbance. Perception, cognition and recognition, ideation and memory are all fairly good. The defect is mainly in the efferent functions of the cortex ; emotion is paralysed, while instinct and volition are ill-directed. The patient performs extraordinary actions which appear to be neither instinctive nor reflex ; yet he tells us that they are beyond the control of his will. It has therefore been suggested that in this disease there is dissociation between the afferent and efferent functions of the cortex. This view receives support from the pathological discovery of Alzheimer that there is gliosis of the deepest layers of the cortex, since Lugaro has decided by a process of exclusion that the function of the polymorphous cells of these deep layers is that of associating efferent with afferent impulses.

This dissociation of function in dementia præcox is, however, not sufficiently characteristic to warrant the adoption of the name ' dementia sejunctiva ' which has been suggested for the disease.

Clinical Varieties.—The various forms of dementia præcox merge imperceptibly into one another, so that it is frequently difficult to refer a given case to one of the classes although the diagnosis of dementia præcox may be easy.

Four varieties of the disease are recognized :

1. Simple dementia præcox.
2. Hebephrenia.
3. Katatonia.
4. Dementia paranoides.

Simple dementia præcox occurs in congenitally weak-minded

children before the twentieth year. It consists of a progressive deterioration of the mental faculties, which is unaccompanied by states of depression, excitement, stupor, delusion or hallucination. It is most frequently seen in idiot asylums. The patients grow apathetic and idle, unable to concentrate their attention upon customary pursuits and become demented in a year or less

FIG. 58.—HEBEPHRENIAC SECLUSIVENESS.

from the onset of the disease; their activity is characterized by mannerisms, negativism, echopraxia and echolalia. This form of dementia præcox is rare.

Hebephrenia, which is more common in men than in women, usually makes its début before the twenty-fifth year. Two subclasses are to be distinguished; in one the chief

mental depression, while the other is characterized by motor restlessness.

The depression of hebephrenia is commonly ushered in by such premonitory symptoms as headache, general malaise and failure of nutrition. The patient becomes shy, seclusive, solitary, moody and depressed. He ceases to associate with his fellows, loses all energy and desire for work and feels tired of life. Hence determined attempts at suicide are frequent in this early stage and the mode of suicide is rather liable to be somewhat bizarre ; for example, one patient attempted suicide by hanging himself stark naked ; another, a medical student, lay in a warm bath and opened the external jugular, median basilic and internal saphenous veins of both sides. Seclusiveness continues to show itself after the patient has been admitted into an institution. If the physician goes through his list of hebephreniacs after he has made his morning round, he finds he has missed many of those not confined to bed ; they have been hiding.

Hebephreniac depression differs from that of melancholia in that it is unaccompanied by the rigidity characteristic of that disorder and in being less persistent. Hebephreniacs momentarily cheer up from their depression, have a good look at their surroundings, laugh in a childish senseless manner which is almost characteristic of the condition and, if they believe themselves to be unobserved, run for a hundred yards or so along the garden path.

At this stage a certain number of cases clear up and make for a partial or complete recovery ; but should the disease develop further, symptoms similar to those of dementia paranoides make their appearance. The patients think that people are making disparaging remarks about them or they believe themselves to be watched and followed by detectives or others. Then come hallucinations, especially of hearing ; more or less systematized delusions follow in due course. A few of these patients subsequently become exalted.

In conduct they exhibit mannerisms and other symptoms characteristic of dementia præcox ; they are untidy in their dress, lounge about and talk to themselves. Their letters are overpunctuated, verbose and stilted ; phrases are frequently repeated and words underlined.

During the whole of this period there is progressive mental deterioration ; the patient becomes more and more apathetic and

loses all capacity for work. As deterioration proceeds, hallucinations sink into the background, delusions become forgotten and within a couple of years the patient is a confirmed dement.

The restless cases differ but slightly from the depressed. The characteristic laughter is more in evidence and the patients are fairly contented and happy. They lounge about in comfortable attitudes but never remain for many minutes together in the same place. They run the length of the ward to seek another seat. They are not missed by the physician on his round like the depressed patients, for they deliberately run away whenever he attempts to approach them.

Deterioration is more rapid in such cases. From the moment of entry into an institution they begin to put on flesh and in a couple of months or so have become grossly fat. By the end of six months the dementia is profound ; they are ' wet and dirty ' in their habits, totally incapable of looking after themselves, slovenly in dress and they carry food to their mouths with the fingers.

Katatonia occurs rather more frequently in women than in men, and at a slightly earlier age than hebephrenia. It is that form of dementia præcox in which the motor symptoms, above described as catatonia and catalepsy, are the chief characteristics. Three forms have to be recognized : katatoniac depression, katatoniac stupor and katatoniac excitement.

Katatoniac depression is frequently mistaken in its early stages for melancholia. After a premonitory stage in which there is headache, loss of appetite, amenorrhœa and insomnia the patients become depressed, anxious and unable to follow their usual occupation. They are quiet and reserved and answer questions in monosyllables. Delusions develop rapidly ; they accuse themselves falsely of past misdeeds, believe that people in the street insult them, either by actions or by word of mouth. They are called by disgusting names or dung is thrown at them.

Examination of the patient reveals diminution of the superficial and increase of the deep (tendon) reflexes, usually with loss of sensation. Rigidity is a striking characteristic but differs from the like symptom in melancholia in being uniformly distributed, the muscular tension involving not only the trunk, shoulders and hips, but also the hands, feet and, in some cases, the face (Snautz-krampf).

Negativism is shown by the patient's refusal to speak (verbi[illegible]

and by his resistance to all kinds of interference. He refuses to take food and has to be tube-fed, a procedure which frequently induces some verbigerative form of speech. But apart from any such interference verbigeration occurs from time to time, often accompanied by mannerisms.

Katatoniac depression is the classical form of katatonia described by Kahlbaum in 1872 and it is probably the most favourable form of dementia præcox, some patients making an apparently complete recovery, even after the disorder has lasted for years. One of the author's patients, who was tube-fed for nearly twelve months at the beginning of her illness, became sufficiently manageable to return to her own home. There she took no real interest in her surroundings. If given a dustpan and broom, she would sweep the same patch of carpet for hours together and it was impossible to maintain a rational conversation with her for any length of time. At the end of six years more or less favourable reports began to be received and eight years after she came under observation, she made a complete recovery, so far as the author was able to ascertain by the most careful examination. Nevertheless the outlook for at least 75 per cent. of these patients is a profound and progressive dementia.

Katatoniac stupor is occasionally preceded by a period of depression ; usually it starts *de novo*. After the customary premonitory symptoms, the patients become quiet and reserved, and gradually pass into a condition of negativism. During the early stages there is peripheral anæsthesia which varies in extent from day to day. There is good perception and hallucinations are unusual ; but they appear in a fair proportion of the cases. The patients are neither depressed nor excited ; they are apathetic. Some, however, display a certain interest in their condition. For example, I have seen a patient take a surreptitious glance at her hands after their atavistic nature had been demonstrated to a class of students. During the demonstration the patient's negativism prevented her from evincing interest in the matter and even induced her to resist examination.

If it is permissible to say that one form of a disease is more characteristic of that disease than any other, then it may be said of katatoniac stupor that it is the most characteristic variety of dementia præcox. It is in katatoniac stupor that atavistic signs and other stigmata are most frequently

encountered; it is in this form of dementia præcox that mannerisms, negativism, stereotypy, verbigeration and automatic obedience (echopraxia and echolalia) may be best studied.

The disorder has received the appellation 'stupor' on account of the immobility and mutism of the patients. They sit in a lounging posture with their hands in their laps or stand apathetically about corners of the ward. They cannot be induced to speak (mutism) or, at most, they will answer questions in monosyllables or ask for their discharge in as few words as possible.

It must, however, be recognized that these patients are not cases of true stupor. They know all that is going on around them and their mutism and immobility are forms of negativism, not of paralysis.

In many cases the limbs will remain in any attitude in which they are placed (flexibilitas cerea), so that a typical patient might serve as an excellent lay figure for an artist, were it not that his negativism would cause him to move away.

Some of the cases are restless and wander up and down spiralwise or like a caged animal. Any obstruction to these movements is either eluded or forcibly resisted.

As in anergic stupor, some of these patients exhibit œdema of the hands, feet and face, and the extremities are liable to be abnormally cold and cyanosed.

Katatoniac excitement is usually preceded by one or other, or by both, of the above varieties of katatonia. At first sight it bears a superficial resemblance to acute mania, but on closer examination is found to differ from that state in many particulars.

There is usually some diminution of sensation in the hands. Perception is normal, even in the most excited cases of katatonia. The patients know their whereabouts and are commonly able to give the date correctly. They recognize and know by name the doctors and nurses. Memory for recent events is unimpaired.

It is, however, frequently very difficult to ascertain all these facts about any given case on account of the patient's inaccessibility. His answers to questions are absolutely irrelevant; whereas in acute mania the patient can usually be induced to pull himself together momentarily in order to give a rational answer.

The conduct, too, of these patients differs from that of acute maniacs in that they do not display excessive large-joint movement. They clench their fists, rotate their forearms, pick

their bedding to pieces and perhaps throw it away. Nor is there the same continuity of motor excitement ; the movements of katatoniacs are sudden, impulsive, violent and reckless. They are wantonly destructive ; they tear clothing, smash windows and articles of furniture, not in anger or for fun, but merely to do that which will be objectionable ; their destructiveness is a form of negativism.

Negativism is displayed in other ways, such as refusal of food, refusal to shake hands, averting the head and, in general, doing the opposite of what is required.

The patients are 'affected' in their behaviour ; they make

FIG. 59.—DEMENTIA PRÆCOX GROUP.

grimaces, perform absurd antics and show signs of stereotypy and catalepsy. They are dirty in their habits, expose themselves indecently, adopt lascivious attitudes to annoy others and smear the walls of their rooms with saliva, urine and fæces.

Such behaviour is sufficient evidence of deficiency of emotional tone and moral sentiment, even if further signs were wanting, which they are not. These patients feel neither joy nor sorrow, fear nor anger, anticipation nor satisfaction and the meaningless imbecile smile, which is too frequently seen, is unaccompanied by emotional feeling.

The speech is confused and more incoherent than in any case

of acute mania. It consists of disconnected words and phrases, which are frequently repeated in the course of a single diatribe (verbigeration) and the language is abusive and obscene (coprolalia).

From the point of view of prognosis this is the most unfavourable variety of katatonia.

Dementia paranoides is a form of dementia præcox in which hallucinations and delusions, especially of hearing and of persecution, play the most important rôle. The disorder is rather more frequent in women than in men. Sixty per cent. of the cases occur after the twenty-fifth year.

Two varieties may be distinguished. One of these is characterized by delusions of persecution and of grandeur, which are constantly changing and associated with mannerisms and other signs of dementia præcox and at times with mild states of excitement. The disorder may be preceded by states of depression and stupor. In this variety dementia supervenes within two years, sometimes within six months, without remission. The other variety, which appears to be identical with Magnan's 'Délire chronique', is a form of systematized delusional insanity in which well-marked stages may be recognized. Remissions occur in a few cases, in which the incidence of dementia is deferred, often for many years.

Sensation is unimpaired and perception is good in both forms of the disease. In the *unsystematized form* hallucinations of hearing rapidly develop after a short incubation period of shyness, seclusiveness and suspicion. The import of these hallucinations is constantly changing and they form the basis of correspondingly variable delusions. The same patient hears mocking voices, proposals of marriage, invitations to leave the asylum, insults, statements that somebody is waiting in the entrance porch for him, that poison is being secretly injected into him, that his clothes have been stolen and are being sold at an auction. He hears that he has obtained a title or some other distinction and suspects the attendants of attempting to appropriate it to themselves. In some cases the voices are referred to telephones supposed to be in the wall and the most absurd messages are received over the wires; one patient, for instance, heard the Austrian Emperor inviting him to drink paraldehyde with him.

Hallucinations and illusions of vision sometimes occur; usually

they take the form of faces and occasionally absurd visions are seen. One patient, on entering the bathroom, saw the bath suddenly stand up on end and lie down again. Hallucinations of smell are not uncommon; they give rise to the notion that poisonous vapours are instilled into the room. Similarly gustatory hallucinations induce the idea that the mouth is filled with objectionable matter.

During this stage patients become emotionally excited and restless, in sympathy with the import of their hallucinations.

As the disease progresses hallucinations become less frequent and delusions tend to be more expansive and more absurd. The patients believe themselves to be capable of speaking hundreds of languages, seeing people's thoughts, creating worlds and emitting light. The delusions change many times in the course of an hour; but they are accepted and expressed without any corresponding emotional feeling.

The patients grow incapable of mental work or continued application to any form of physical labour, and dementia becomes confirmed in spite of comparatively good perception, orientation and memory.

The *systematized form* of dementia paranoides is divisible into four well-marked stages.

The first stage is common to all forms of dementia præcox, but is so well marked in dementia paranoides that it has been specially named the 'period of false interpretation'. The patient, whose normal mental attitude is one of suspicion, grows more suspicious and distrustful; he sees hidden meanings in trivial incidents. If people do not notice him as he goes to business, it is because they wish to avoid him; if they look at him, it is because they are detectives and he is under the surveillance of the police. One man coughs to draw attention to the patient, another blows his nose in order to conceal a smile with his handkerchief and a boy whistles a mocking tune as he passes. In the newspapers there are hidden references to his past life.

At this stage he may become depressed and despondent and accuse himself falsely of having lived a life of sin. Other patients complain to the police that they are being followed or persecuted by some unknown person or they take to travelling to escape their enemies. Others again, of a more active disposition, become violent and strike passers-by whom they suppose to have insulted them.

The second stage is characterized by the development of hallucinations of hearing, which reinforce any previous ideas of persecution and help to determine the character of the subsequent delusional state. The profound impression created by these hallucinations cannot be over-estimated. At first they may take the form of an unintelligible babel of voices; later, isolated words are heard, some being yet unintelligible, such as 'thiefist', 'death-swivel', then 'murderer', 'sodomite' etc. Then short sentences are heard in which remarks are made about the patient's doings.

In some cases two voices or sets of voices are distinguished, one accusing or annoying the patient, the other defending him, accusations and insults being heard with one ear and friendly remarks with the other.

The idea of friendliness or protection is welcomed by some patients at this stage to such an extent that it displaces the ideas of persecution and becomes the main element in the delusional state. Important persons may be fixed upon as their guardian angel—the Lord Mayor, the Queen, the Emperor of Germany or the Pope.

Verbal psychomotor hallucinations are experienced by some patients and give rise to the delusion that people are able to read their thoughts. Olfactory and gustatory hallucinations, which are not quite so common, induce corresponding delusions.

Hallucinations of the cutaneous senses occur with some frequency and are often referred to by some neologism of the patient; he complains that he is 'spreethed', 'torched' or 'cheefened' at night or annoyed by 'the electric pin'.

Genital hallucinations, when they occur, induce the delusion in women that they are pregnant or that they have been violated; and in men that they have been castrated, or that painful erections have been caused by some base means.

Visual hallucinations are very rare and, when they appear, the patients seem to realize their true nature, at least to such an extent that the course of the disease is unaffected by their occurrence.

The persistence of these hallucinations and ideas of persecution gradually leads the patient to believe that he is the victim of a systematic conspiracy to annoy him, or of a band of persecutors, perhaps under the floor. Sometimes he fixes upon an individual of his acquaintance as the cause of all his trouble. It

is in such cases as these that murder becomes an incident in the disease and the case acquires medico-legal importance.

Remission may occur and the patient make an apparent recovery during the first or during the early part of the second stage of the disease ; but if the second stage becomes well established or the patient enters upon the third, about to be described, the prognosis is absolutely hopeless.

The third stage is characterized by the development of delusions of grandeur which gradually efface those of persecution. Not all the cases, however, develop grandiose ideas. Many become demented without having experienced any expansive delusions. Authors differ as to their frequency, but there appears to be little doubt that at least half of these patients pass through a stage of grandeur. It is said to arise in one or more of three different ways :

1. The patient seeks a reason for his continued persecution and comes to the conclusion that he must be somebody of importance.

2. He hears himself referred to in hallucination as some great personage.

3. An accidental occurrence, a misinterpreted conversation or a chance resemblance observed by the patient between himself and some magnate portrayed in the illustrated papers directs his attention to the idea that he is an important individual.

One of the author's patients observed a resemblance (a very remote one) between himself and the Duke of Saxe-Coburg. Thenceforward he believed himself to be of royal descent. Another heard in hallucination the words 'His Majesty'. From that moment he regarded himself as King Edward VII. A third turned his attention to an incident of his childhood when he and several other children were stampeded by a runaway horse and were subsequently rescued by their respective mothers. This patient now believed that the woman, whom he had hitherto regarded as his mother, had selected the wrong child on that occasion. He saw hidden meanings in many past events and the delusion gradually became crystallized that he was a member of the aristocracy.

We must not allow ourselves to be misled into supposing that this classification of the modes of origin of expansive delusions offers any explanation of their occurrence. The main fact that we have to realize is that it is in the nature of this disorder that

a stage of grandeur should develop in most cases, for we have seen that the hallucinations and delusions tend to become expansive even in the unsystematized variety of dementia paranoides. It seems obvious that the true explanation of this stage must be psychological. The item of experience which would supply the knowledge we require appears, however, to be missing. For instance, it would be interesting to know if a sane individual, subjected to real persecution similar to that from which these patients believe themselves to suffer, would ultimately tend to become exalted.

When ideas of grandeur first begin to develop it is usually a difficult matter to elicit them even by the most searching examination. The patient remains reticent about them for months ; but when they are well established he is prepared to give expression to them and even to reiterate them with untiring monotony. It is sometimes possible to discern the incidence of expansive delusions by a change in the patient's behaviour. He talks with a more self-confident air than hitherto, disdains his relatives as being unworthy of him and carries himself with unmistakable *hauteur*. All this emotional display ceases as soon as his reticence has disappeared. He gives stilted glowing accounts of his greatness without displaying any trace of emotional activity.

During this stage the hallucinations gradually cease, delusions of persecution fade away and the patient passes into the fourth and final stage of dementia.

This dementia resembles the terminal stages of other forms of dementia præcox. There are stereotyped antics, mannerisms and modes of expression ; the patients are careless about their dress, untidy and dirty in their habits. On the other hand, sensation, perception, cognition and memory suffer little or no impairment.

This form of dementia paranoides differs from all other forms of dementia præcox in that the terminal stage is long delayed, often for years ; but the deterioration tends to progress from first to last without remission.

Course and Prognosis.—In the majority of cases, dementia præcox proves to be a progressive disease leading to *profound dementia*. In a few cases the progress of the disorder is arrested and the patient remains in a condition of *partial dementia* with poverty of character, deficiency of judgment and reasoning power,

psychical apathy, loss of morale and, in general, limitation of the mental horizon. There is failure of ambition and energy so that the patient is satisfied to lead an idle life and become a parasite on his friends and relations. University graduates are content with manual labour on a farm ; patients who have started on a lower grade of intelligence become the victims of evil companionship, the dupes of designing persons and perhaps take to drink. *Recovery*, apparently complete, takes place in a very small proportion of cases. Lastly there is an *intermittent form* of the disease, in which the patient makes a fairly good recovery. Then he relapses several times before dementia is sufficiently pronounced for him to require permanent care in an asylum. With some cases of this kind remission and intermission takes place at short intervals of a fortnight or a month. In the latter case, the intermissions are occasionally associated with menstruation.

Dementia præcox appearing for the first time after forty years of age is incurable.

The severity of the symptoms is a very fallacious guide to prognosis ; some patients, who show but slight symptoms in the early stage of this disease, sink steadily into dementia.

Prognosis differs slightly in the several varieties of dementia præcox. Kraepelin gives the following results of his statistical investigations :

Of hebephreniacs 75 per cent. sink into profound dementia, 17 per cent. are but partially demented so that under supervision they are capable of a certain amount of useful work and 8 per cent. apparently recover.

Of katatoniacs 86 per cent. reach extreme dementia, 27 per cent. are partially demented but sufficiently improved to justify their being allowed to return home and 13 per cent. recover, at least temporarily.

In dementia paranoides recovery never takes place. Short remissions occur infrequently among the unsystematized cases and temporary arrest among the systematized ; but the ultimate outlook is invariably hopeless.

Pathological Anatomy.—The convolutional pattern of the cortex is often abnormal, but otherwise the brain exhibits no naked-eye changes.

With regard to microscopical appearances, Alzheimer, Mott and others have described areas of gliosis or gliomatosis in the deeper layers of the cortex and Turner has described immature

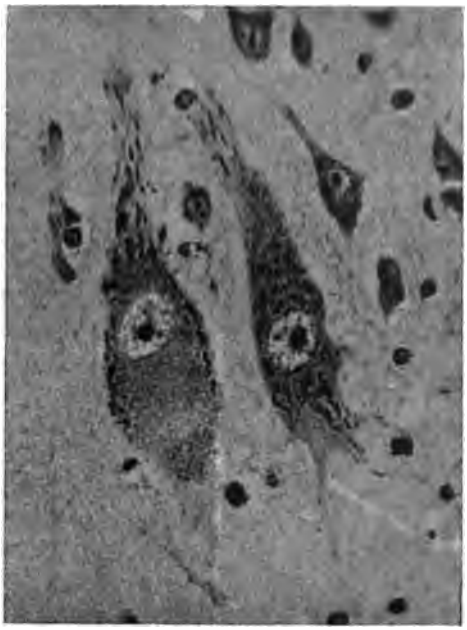


FIG. 60.—TWO BETZ CELLS.

The one to the right shows a normal arrangement of its Nissl bodies and the nucleus is in a normal position. In the upper part of the cell is a small collection of pigment. Note that the axon and the eminence from which it springs are devoid of Nissl bodies.

The other cell is somewhat swollen, has a displaced nucleus and the Nissl bodies are small dust-like particles. This represents a defectively developed or immature form of cell, found in idiocy, imbecility, epilepsy and dementia præcox (× 400). [Negative kindly lent by Dr. John Turner of Brentwood Asylum.]

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nerve-cells, one of which is figured in the accompanying photo-micrograph. In advanced cases there is widespread destruction of nerve-cells throughout the cortex, many being shrunken, distorted and eroded at the margin. The nuclei also are shrunken and dislocated and they stain deeply with methylene blue.

The abnormal arrangement of the convolutions and the existence of immature nerve-cells both indicate inherent structural deficiency of the nervous system.

Treatment.—Since the pathology of this disease is still somewhat obscure, the treatment must, for the present, be merely symptomatic. When the patient first comes under observation, he is almost invariably found to be suffering from malnutrition and insomnia. Accordingly our first efforts are directed to increasing his weight and procuring sleep. These results are to be obtained in the same manner as in mania and melancholia. The patient requires plenty of rest and the treatment must accordingly be carried out in bed. The duration of bed treatment varies with the severity of the case. Mild cases of hebephrenia and dementia paranoides may be allowed to get up for a few hours each day after the lapse of a fortnight or three weeks. Some severe cases of katatonia require rest in bed for six, nine or even twelve months before a satisfactory state of nutrition is achieved.

Unfortunately in the majority of cases this is all that can be done for the patient and for the present we have to be satisfied with making the remainder of his days as happy as we can.

Occupation is beneficial to patients suffering from the systematized variety of dementia paranoides and mild forms of hebephrenia. Life in a colony for the insane is well adapted to such patients ; ordinary home life does not suit them. They are easily irritated by people who do not understand them and, on the other hand, they are usually very irritating to other people.

Quite recently some cases in America are said to have been improved by excision of the thyroid gland. Further evidence must be forthcoming before such a measure is likely to be attempted in this country. It is difficult to see the rationale of the proceeding.

CHAPTER VI.

GENERAL PARALYSIS

(DEMENTIA PARALYTICA).

GENERAL PARALYSIS is an organic disease of the cerebral cortex, usually occurring in the fourth decade of life, possessing a large array of clinical symptoms, leading to progressive motor paralysis and profound mental deterioration and terminating fatally, with very few exceptions, in two or three years.

Etiology.—There are many considerations which support the view that syphilis is the essential cause of general paralysis. Perhaps the least important of these are the statistics relating to the number of general paralytics in whose cases various physicians have obtained a history of past syphilis, since the numbers vary with different observers from 1·6 to 94 per cent. Further, while a positive history of syphilis is usually reliable enough, a negative history is frequently unreliable, even among the sane. Crocker states that he fails to obtain a history of syphilis in 20 per cent. of his syphilitic skin cases; Hirschl failed to obtain a history in 36·5 per cent. of patients suffering from tertiary manifestations and Jumon states that he has diagnosed unnoticed infection in the secondary stage as follows: in men, 5 per cent.; in women, 20 per cent. and in the tertiary stage, 17 per cent. Further, Fleiner in his reports on syphilis occulta shows how frequently syphilis exists without the patients having the slightest idea how or when they were infected.

The possibility of inherited syphilis must not be forgotten. Of some ninety cases of juvenile and adolescent general paralysis scattered through the literature, evidence of inherited or acquired (three cases) syphilis has been obtained in some 90 per cent. Sérieux and Farnarier have had a case of general paralysis in an adult occurring thirty-two years after he had acquired syphilitic infection. Mott has reported three cases occurring at twenty-one

years, one at twenty-two years and two at twenty-three years of age, in most of whom there were signs of inherited syphilis. Dr. Percy Smith has reported a case occurring at twenty-four years of age, who had certainly not had syphilis and had no signs of inherited syphilis, but whose father had acquired the disease and died of general paralysis. In the same paper a similar case is reported as occurring at twenty-eight years of age. Her father died of general paralysis and her sister had a very definite history of chronic interstitial keratitis, but the patient showed no signs of inherited syphilis.

Further, the average of the percentages of syphilitic histories exceeds that of the percentages of alcoholism, insane heredity, traumatism, sexual excess and other assigned causes of general paralysis.

Adult general paralysis is usually found in persons who have acquired syphilis in early adult life.

Adult general paralysis occurs in the pauper class four times as frequently in men as in women, and in the private class fifteen times as frequently. This difference between the two classes is what we should expect on the supposition that syphilis is the cause of general paralysis, in view of their different social customs. We may correlate the pauper statistics with the statement from Denmark, where syphilis is a notifiable disease, that syphilis occurs four times as frequently in men as in women.

Adolescent and juvenile general paralysis occur with almost equal frequency in males and females, females preponderating to a slight extent. This also is what would be expected on the hypothesis that general paralysis is a metasyphilitic disease. Males and females are equally exposed to the inheritance of syphilis; general paralysis would therefore be expected to be equally distributed between the sexes when considering the juvenile and adolescent cases, with a slight preponderance of females as in the general population.

The professions are represented among general paralytics in proportions which are in accordance with the hypothesis of syphilitic origin of the disease. For example, one-third of Hirschl's cases and two-thirds of Garbini's cases belonged to the labouring class, 90 per cent. of Krafft-Ebing's cases were officers in the army, while Hirschl had only one Roman Catholic priest among his 200 general paralytics and Krafft-Ebing had no such instance among his 2,000 cases of general paralysis. Salaris

states that there was only one case occurring in Sardinia during the years 1891-1897 in a priest, and that priest had certainly had syphilis. Bouchard has also demonstrated the infrequency of general paralysis among the clergy.

The geographical and racial distribution of general paralysis bid fair to throw light upon the etiology of the disease. In Dr. Macpherson's 'Mental Affections' the author remarks: 'It may be generally stated that the disease does not exist in the Highlands of Scotland or in Ireland outside the larger cities, or in the more rural and remote districts of Wales and the South of England. It reaches its maximum in the busy manufacturing towns of the Midlands, and in the larger cities of the United Kingdom.' Similar remarks apply to Sweden. The author continues: 'Taking a wider geographical area, it is present in the countries of Western Europe and North America, and is practically unknown among the uncivilized nations of the world.'

In Germany general paralysis has invaded the more rural districts to a greater extent than formerly; but this can be accounted for by the military organization which exists there, whereby every man is exposed in his youth to barrack-room life and syphilization.

This distribution of general paralysis corresponds fairly well with the distribution of syphilis; the latter disease, however, is rather more widely spread and there are some special countries which demand closer investigation.

Syphilis is a rare disease in Iceland and does not spread through the population. Schierbeck, the principal medical officer of Iceland, met with only four cases in eight years. 'Its introduction is not safeguarded by the habits of the people, as by the necessary isolation imposed by Nature on the inhabitants of this barren island.... General paralysis has been observed once only in the capital of the country, and then in a man who for six years had led a somewhat fast life abroad; and perhaps twice in the only port of Iceland, where there are some members of the native population who accept the advances of foreign sailors, and who have occasionally been infected by them.' On the other hand, we find that in China and Japan there is a large amount of syphilis, an enormous amount according to some authorities; but general paralysis is comparatively rare (2 per cent. in the asylums in Tokio some ten years ago). Again, in Mohammedan countries syphilis is rife but general paralysis comparatively rare.

Mott quotes a letter from Warnock in which he states that a short time ago there were twelve general paralytics at the asylum of Cairo (the only one in Egypt) out of an insane population of 450.

Basing conclusions upon the racial distribution it is argued that general paralysis is essentially a disease of civilization.

It is an interesting observation that there has been only one case of general paralysis reported as having a Hunterian chancre upon him at any time during his general paralysis ; and Krafft-Ebing has communicated the results of an unknown experimenter who attempted to inoculate nine general paralytics with fresh syphilitic virus from a hard chancre, but failed in every instance. In his Morrison lectures Dr. Ford Robertson states, on the other hand, that Professor Bianchi has seen cases in which general paralysis has preceded infection by syphilis.

By Bordet and Gengou's method Marie, Morgenroth, Plaut and others have demonstrated that antisyphilitic bodies exist in the serum and cerebro-spinal fluid of general paralytics, the quantity increasing as the disease advances.

In view of the above considerations, the conclusion that syphilis is the most important factor in the causation of general paralysis is irresistible. Nevertheless it is obvious that syphilis cannot be the only factor, for there are many nations in which syphilis is rife but general paralysis almost unknown ; and even in those nations where general paralysis is a common disease it occurs in only two per cent. of syphilitics.

In a paper in the *British Medical Journal* of January 4, 1908, Mott quotes evidence to show that there may be a special neurotoxic variety of the *Spirochæta pallida*, now known as the *Treponema pallidum ;* in other words, there is probably a special general-paralysis-producing variety of syphilis.

In all probability alcoholism plays an important rôle. Various authors report a history of alcoholic excess in 3·4 to 75 per cent. of their general paralytics and I believe I am right in stating that I have never had a patient suffering from general paralysis who had previously been a teetotaller. Insane heredity has been reported in 5·4 to 57 per cent.

It may be that all these factors are to be regarded as contributory causes. They are all looked on by the Scotch school as merely predisposing to general paralysis ; Dr. Ford Robertson and Dr. MacRae believe the disease to be due to an invasion of the body by diphtheroid micro-organisms. These authors claim to

have discovered in the bronchi and intestinal tract spots of inflamed mucosa, where these diphtheroid bacilli are present in large numbers and are capable of entering the general circulation owing to impairment of the local and general defensive forces of the organism. They report that they have discovered these bacilli in the blood, cerebro-spinal fluid and urine of general paralytics; that the phagocytic action of the polymorphonuclear leucocytes against the *Bacillus paralyticans* (sic) is increased in general paralysis, indicating a partially acquired immunity against the bacillus, and that they have produced symptoms resembling general paralysis in a goat and in some rats and mice by inoculation with the bacillus.

Dr. J. W. H Eyre and Dr. J. F. Flashman (Brit. Med. Jour., Oct. 28, 1905), in their criticism of this work, examined swabs from the throats of 162 persons, sane and insane, and found the percentage incidence of diphtheroid organisms to be no greater in the insane than in the sane, nor greater in general paralytics than in other insane patients. Post-mortem, however, they found diphtheroid organisms in the respiratory tract of four general paralytics out of ten, but in only four out of twenty-six cases that were not general paralytics. Dr. Ford Robertson in reply to points out that pneumococci and Klebs-Loeffler bacilli are to be found in the mouths of persons who have never suffered from diphtheria or pneumonia.

The *Bacillus paralyticans* is still *sub judice*, but the criticism that at once occurs is that a case has still to be recorded of any person in feeble health or of any attendant on the insane becoming infected with general paralysis from another person. It is further to be noted that Dr. Ford Robertson has been able to demonstrate in sections of brain from cases of general paralysis only 'partially dissolved micro-organisms, which can in many cases be recognized to have the characters of diphtheroid bacilli'.

Physical Signs.—Although tertiary manifestations of syphilis are of rare occurrence in general paralysis, tabes dorsalis, which has also been regarded as a late sequel to syphilis, is recognizable clinically in about 25 per cent. of the cases, and some degeneration of the posterior columns can be discovered post-mortem in nearly every case.

It is found clinically that tabes associated with general paralysis is seldom very advanced and the diagnosis, as a rule,

is dependent merely on the association of absence of knee-jerks with loss of the pupillary light reflexes. Anæsthesia, lightning pains and extreme inco-ordination are exceptional.

Epileptic and epileptiform (Jacksonian) convulsions and so-called apoplectiform attacks are manifestations liable to occur at any time in the course of the disease; they may be the initial symptom calling attention to the patient's condition or they may be the concluding event determining the fatal issue. They are, however, most common in the second stage.

Epileptic fits occurring in the course of general paralysis are in no way distinguishable from those seen in idiopathic epilepsy. Batches of fits are not infrequent, giving rise to a true status epilepticus. Isolated fits occur in all degrees of severity and I have seen attacks indistinguishable from minor epilepsy followed by typical post-epileptic automatism.

Similarly *local fits* without loss of consciousness, in no way distinguishable from the Jacksonian convulsions seen in cases of subcortical tumour, are liable to occur in the course of general paralysis. Naturally enough, they begin most frequently in the thumb and forefinger of the right hand, opposition of the thumb being the most recently evolved, most voluntary and therefore most unstable motor function of the cortex. The convulsion travels up the arm, usually as far as the shoulder, and leaves the limb paralysed for some hours or days after the attack.

In an *apoplectiform attack*, similar local paralysis occurs without previous convulsion and, in like manner, passes off within a few days. Such an attack is usually associated with disturbance of consciousness, varying in degree from mere somnolence and confusion to a condition resembling true apoplexy with coma and stertorous breathing. As consciousness is restored, it is found that the patient is suffering from hemiplegia or brachial monoplegia (both are usually on the right side), accompanied perhaps by motor aphasia and apraxia. Sensory and motor aphasia may also occur independently of other paralyses. All these paralyses pass away in the course of a few days or weeks.

Closely allied to these are *attacks of fever* in which the patient's temperature rises above 100° F., perhaps to 104° F., no visceral or other lesion being discoverable to account for the rise. It has therefore been ascribed to disturbance of the heat-regulating centres, especially of the vasomotor centre, since the

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attacks are frequently accompanied by pallor or, more often, by flushing and swelling of the face.

The so-called *automatic movements* of general paralysis may be most appropriately mentioned in this place, since they are to be regarded as more or less of the nature of a chronic convulsion. They are *instinctive* rather than automatic and consist of constant involuntary movements, usually about the mouth, movements of sucking, chewing, smacking the lips, tasting, deglutition, and grinding of the teeth.

Perhaps the commonest and most characteristic motor disturbance is *tremor*, especially about the face, tongue and hands. The lower part of the face is most affected, in contradistinction to alcoholic tremor which affects mostly the upper part of the face. If the patient be asked to show his teeth, the upper lip is seen to be tremulous owing to weakness of the levators and zygomatics.

The lingual tremor is best seen when the patient is directed to protrude his tongue slowly. Characteristically it is an antero-posterior tremor, so-called trombone movement, not a rippling on the surface of the tongue as in alcoholism. I have several times observed tremor of the uvula in general paralysis.

Hand tremor is best brought out by getting the patient to extend and separate the fingers, the wrist being extended at the same time.

Weakness of the lower limbs sets in as the disease advances. The gait becomes at first shuffling like that of an old man, the patient scarcely raising his feet from the ground, so that he is liable to stumble over slight obstacles. Later the gait becomes tottering and finally the patient has to be kept in bed to avoid falls. Here contracture of the flexor muscles sets in and progresses until the patient's knees are almost up to his chin.

The muscles waste, especially the interossei and the muscles of the thenar and hypothenar eminences, and Lenzi has found on electrical examination in some cases kathodal closure contraction equal to anodal closure contraction.

The commonest pupillary change in general paralysis is sluggishness, diminution or absence of the reflex to light on both sides. This is one of the cardinal signs of the disease ; but I have met with several cases in which the disease ran its course without loss of reaction to light at any stage. Marandon de Montyel, however, who made a careful examination of the pupil reflex in

140 general paralytics from the onset of the disease to the death of the patient, states that in no case did he find the pupils normal from beginning to end. He found in some cases exaggeration of the reflex in the initial phase, but this was always succeeded by diminution. Consensual pupillary reaction, contraction when light is thrown into the opposite eye, may be abolished before, simultaneously with or subsequently to loss of the direct reflex.

In some cases loss of the light reflex is coupled with loss or diminution of the pupillary contraction associated with convergence. This symptom is occasionally unilateral with the result that the pupils are markedly unequal in diameter, the difference being often as much as, or even more than, two millimetres.

Occasionally the pupils are eccentric, of irregular outline or oval. Pilz, Marina and others have shown that these phenomena are due to disease of the ciliary ganglia.

Nystagmus and, in the tabetic cases, ptosis are sometimes observed.

There is almost always some contraction of the visual field in general paralysis. Optic atrophy, although fairly frequent, is usually slight ; but it may be complete in some tabetic cases. I have seen one (atypical) case of complete optic atrophy in general paralysis with exaggerated knee-jerks. In 1881 he had forty-three boils on his body (? syphilis) ; in 1882 loss of memory and difficulty of articulation which cleared up in six weeks ; in 1888 he gradually lost the sight of his right eye and in 1894 he was admitted to Bethlem with general paralysis, complete optic atrophy in the right eye and partial atrophy, which increased under observation, in the left. He died of the disease in 1896.

Kéravel and Raviart state that sclerosis of the optic nerve in tabes is insular, but in general paralysis annular. In the author's experience, there is this clinical difference : that in tabes the physiological cup tends to be filled in more than in general paralysis. A slight amount of swelling of the disc (½ to 1 diopter) may occur in the early stages of the disease.

In depressed cases the superficial reflexes are commonly diminished or absent, especially the scapular, epigastric, abdominal, cremasteric and gluteal. Stroking the sole of the foot almost invariably elicits a flexor response (except after a seizure) ; but I have seen an extensor response in three cases.

The pharyngeal reflex is abolished in nearly all cases, frequently in the earlier stages of the disease, invariably in the later.

The tendon reflexes are abolished in the tabetic patients (about 25 per cent.), exaggerated in the remainder. This exaggeration is well marked in both upper and lower limbs. Ankle-clonus does not occur in uncomplicated cases. The exaggeration of the knee-jerk is almost characteristic in that the excursion of the foot is large, the anterior movement lively, but the return (semimembranosus action) sluggish. As a result, the knee-jerk has a 'floppy' aspect. This exaggeration of the knee-jerk becomes less marked as the disease advances.

Malnutrition of the skin is evidenced by the furrowed nails and 'glossy skin' frequently seen in the hands and feet. Bed-sores are liable to develop at points of pressure, especially over the sacrum, buttocks and trochanters; since the patients lose control, first of the bladder, then of the rectum, in the terminal stages of the disease.

Frequently retention of urine is an early symptom demanding the passage of a catheter. In some cases there is an increase in the quantity of urine passed during the twenty-four hours. In other cases the urine dribbles away, apparently owing to relaxation of the sphincter vesicæ.

Signs of arterial degeneration may be observed in some cases, a distinct jog being noticeable in listening over the first part of the aorta with a wooden stethoscope (dilated aorta). The pulse tension is said by Dr. Craig to be low, except in depressed patients during the early stages of the disease. In his original paper he stated that the blood-pressure was raised in the exalted cases.

Mental Symptoms.—General paralysis is a disease tending to the progressive destruction of the whole nervous system. Accordingly we find that the earliest symptoms of the disease consist in deterioration of those functions of the nervous system which were the latest to be acquired. The memory for recent events and proper names is faulty: the patient's accomplishments are not up to their former standard of excellence. The business man fails to drive a bargain with his former success, the artist's pictures lack their earlier vigour and the musician's performances receive no encore as of old.

Apart from the tabetic cases, there is no loss of cutaneous

sensation, even in the most advanced stages of general paralysis. The patient responds to a pin-prick in any part of the body, even in the terminal stage of his disease ; but, it must be admitted, there is no means of ascertaining whether the response is purely reflex or dependent on cortical activity. Hyperæsthesia occurs in some of the excited cases.

Attention has been directed to anæsthesia of the ulnar nerve in general paralysis, the ' funny-bone ' sensation being absent when the nerve is nipped on the inner side of the elbow. In the author's experience, this symptom occurs in less than half the cases.

The olfactory sense is frequently lost on one or both sides (anosmia) and there is often diminution of the sense of taste (ageusia), especially for salt. The sense of hearing is almost invariably diminished in the late stages, sometimes in the earlier stages of the disease ; but there appears to be no limitation of the range of hearing, the high notes of a Galton's whistle being heard as well as formerly, if they are loud enough.

Hallucinations of vision or of hearing occur in about 25 per cent. of the cases, but they seldom form a prominent feature in the clinical picture. Perception remains fairly good as a rule, until the later stages of the disease, when the patient gradually becomes more and more oblivious of his surroundings and incapable of appreciating their nature (imperception). His notions of time and space necessarily disappear *pari passu* with loss of ideation and perception.

Judgment and reasoning are impaired almost from the first and delusion is the rule. In the classical form of the disease the delusions are expansive in nature. The patient believes himself to be possessed of wealth beyond the dreams of avarice ; his treasures are to be measured, not by millions, but by ship-loads and his estates comprise gold-mines and continents. He is a mile high and weighs tons. He is King, Emperor, nay, God Himself. He can slay his millions or raise the dead at will. He can play a hundred instruments and speak a thousand languages ; and, being asked to give an example of any one of these, he will break into an unintelligible jargon. He will tell you that he is the champion runner for all distances and, being asked his time for the hundred yards, display utter ignorance of athletics by answering ' Three minutes '.

Although the classical type of delusion in general paralysis

is of the expansive variety, fancies of this nature appear to be nowadays less common than in former years. Melancholiac and hypochondriacal delusions are now more frequently encountered. In their characteristic form, however, they still retain an element of expansiveness. The patient believes that he owes millions to the King, that he is the King himself and cannot bear the weight of such responsibility, or that he has been suffering for thousands of years. Other delusions are more hypochondriacal in character; there are tons of fæces in the abdomen, gallons of treacle in his chest, a harp in his throat, or his brain is too big for his skull. This curious mixture of depression and exaltation, melancholiac megalomania, is peculiar to general paralysis.

Delusions of persecution are not uncommon. When they occur they lack the systematization of those of the paranoiac.

The defect of reasoning power is well illustrated by a symptom first described, I believe, by Joffroy. Very shortly after the onset of the disease the patient is unable to do simple arithmetical sums on paper. He adds or multiplies from left to right; or perhaps in multiplying, say, 35 by 5, he will say 'Five fives are twenty-five' and put down 25 on the answer line, the ultimate appearance of the sum being:

$$\begin{array}{r} 35 \\ \times\ 5 \\ \hline 1525 \end{array}$$

In some cases the patient gives up the attempt without putting pen to paper.

The most striking changes take place in the domain of action or conduct. One by one, the patient loses control of his instincts. He ceases to attend to business, spends money recklessly and occupies the whole of his time out of doors playing games or motoring. Then he loses control of the sexual instinct, exposes himself or commits some indecent assault whereby he falls into the hands of the police. He makes absurd collections, sets to work to buy up all the grandfather's clocks in London, buys a gramophone with thousands of valuable records: all the while he can afford none of these things. At this stage his friends begin to realize the true state of affairs and place him in an asylum or at least in such conditions as will put an end to his extravagance; but the collecting instinct continues; he hoards

up all sorts of rubbish, old newspapers, worthless pebbles, buttons, odd playing-cards and chessmen.

He becomes conceited, boastful and ambitious like a boy of fifteen, differing however from the latter in that he develops delusions of exaltation with regard to his prowess, capabilities, health, wealth and position.

The eating instinct gets out of hand : he eats ravenously, even when he has only just completed a meal, and bolts potatoes and slices of meat whole. It is on account of this symptom that general paralytics are systematically fed on mince in institutions for the insane.

By this time the patient's circumstances are usually such that the constructive instinct is not allowed full play ; but he will often paint pictures which are surprisingly good considering that he has never put brush to paper before or he may make attempts, usually not so good, to write music. He is full of schemes for benefiting humanity. He would make eggs from old oyster-shells, warm the poles by a system of hot-water pipes, tunnel the earth to Australia or take personally-conducted tours round the planets.

Then he becomes destructive, tears up his clothing or smashes windows or such articles of furniture as vases and flower-pots.

Practical joking is not an uncommon feature about this stage.

There is sometimes a transient return of the instinct of make-believe. For example, the patient will say that he is a Spanish onion, a poached egg or a pat of butter ; not that he believes such absurdities, but merely in the playful spirit of make-believe.

Before the general paralytic has lost control of these early instincts degeneration of those more lately acquired has already begun. The out-of-door instinct has gone ; he has no desire for hunting, fishing, shooting, motoring or out-door games. Similarly his sexual instinct disappears. He ceases to collect rubbish, or anything else for that matter. His boastfulness and conceit vanish and he forgets former delusions. He no longer evolves schemes, he becomes less destructive, loses the instinct of cleanliness and is wet and dirty.

The instincts to walk, stand and sit up disappear in turn and the patient reverts to the infantile age at which he crawled on all-fours.

As with the instincts, so with the emotions. During the earlier stages of the disease the patient is excessively emotional; he laughs or weeps at nothing and a sympathetic word suffices to evoke a flood of tears. At other times he flies into a passion of anger without any adequate cause. In the later stages, on the other hand, emotion disappears to such an extent that even the normal expression of the man's face, largely dependent on the naso-labial furrows, is obliterated.

Memory is affected from the first. Appointments are forgotten, the key is left in the safe, the patient cannot tell the date or recall the names of his friends. In the later stages of the disease he becomes incapable of recognizing friends and relations.

Speech is markedly disturbed from the beginning. The vocabulary becomes more and more limited, proper names being the first to go, then common nouns, adjectives, verbs and interjections. Interjections are the last parts of speech to be lost and of these, ' yes ' and ' no ' are the very last. The first volitional word of the infant ' yes ' is the last word uttered by the general paralytic, should the disease run its complete course without being cut short by some fatal intercurrent illness.

Incoherence occurs in the majority of cases during some period of the disease. In some cases it is due to the flight of ideas being too rapid for the patient's language to keep pace with them ; in others it is owing to mental confusion.

Some general paralytics exhibit a form of mutism, voluntary aphasia.

As a rule, the speech is slow, hesitating and often stammering. The patient has difficulty in finding the word he requires. The continuity of a sentence is frequently cut short by his forgetting the subject of his discourse and the most trivial interruption serves to produce such a result.

Defect of articulation, although a physical rather than a psychical symptom, is best considered in this place. The general difficulty of articulation leads to stuttering and the elision or repetition of syllables and words. On account of tremor and loss of control of the muscles of articulation the consonants are blurred and uttered in a quivering manner. Various phrases, some of which are unnecessarily difficult, have been devised as special tests for the articulation of general paralytics. The following are a few examples :

'Around the rugged rock the ragged rascal ran his truly rural race.'

'The Irish constabulary extinguished the conflagration.'

'She stood at the door of Burgess's fish-sauce shop, welcoming him in.'

'She sells sea-shells and shaving soap.'

'Biblical commentators.'

'Irish artillery.'

In reading aloud, the general paralytic omits some words, interpolates others and modifies yet others to a slight extent, so that the writer's meaning is misinterpreted.

Written language suffers in much the same way. Letters and words are elided or reduplicated. The patient becomes confused in the construction of long sentences and seldom attempts, for example, a dependent sentence with a possessive pronoun. As a result, all his correspondence is carried on in short sentences, then disjointed phrases and, lastly, disjointed words.

In writing to dictation he omits words, interpolates others which are not dictated to him and modifies others in much the same way as when he reads aloud.

The calligraphy becomes puerile: the lines are not straight, but undulating; the individual letters are separated from one another and sometimes show evidence of hand tremor. As the disease advances the writing becomes larger so that a dozen words suffice to fill a sheet of notepaper, apart from smudges and blots which are an invariable accompaniment.

After a short preliminary period of insomnia during the early stages the patient is liable to fall asleep at all hours of the day, even while he is in the midst of a most important piece of business, and he sleeps heavily at night. As the disease advances, persistent motor restlessness becomes a prominent symptom during the day and he again sleeps badly at night. This insomnia persists until the later stages when sleep once more becomes excessive.

The general paralytic is a very suggestible individual and, as a rule, is easily managed, especially by strangers. His volition is so weak that with tactful management one can always lead or thwart him.

Stages.—Apart from the prodromal stage in which the patient suffers from occasional headaches, tinnitus aurium, formications,

local flushings and pallors, lapses of memory and partial incapacity for business matters, general paralysis is usually divided into three stages, which cannot, however, be sharply distinguished from one another.

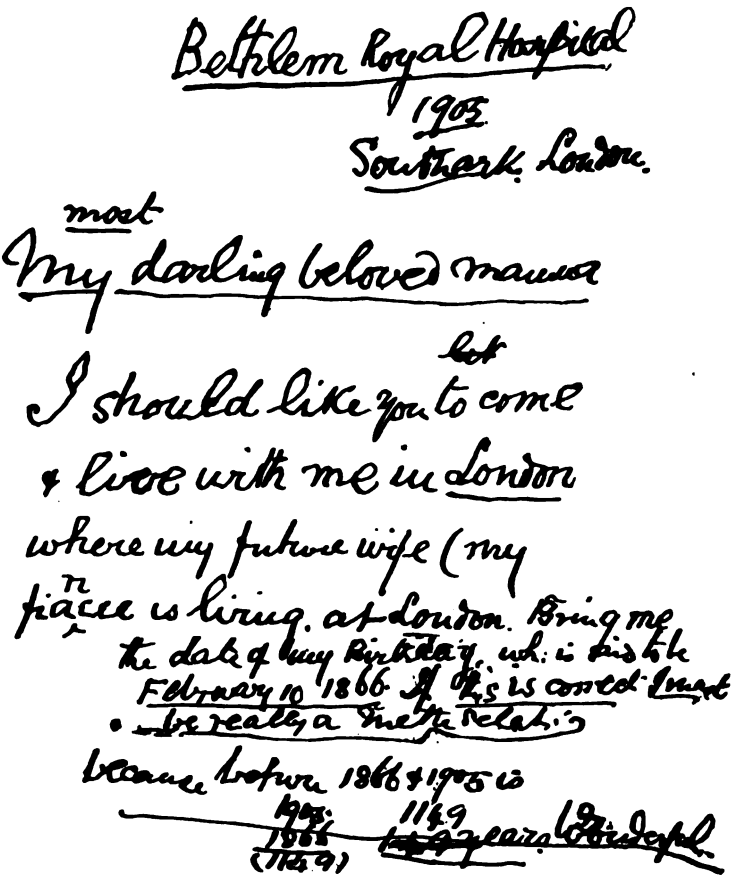
Bethlem Royal Hospital
1905
Southwark London.
most
My darling beloved mama
but
I should like you to come
& live with me in London
where my future wife (my
niece is living at London. Bring me
the date of my Birthday, wh: is his to be
February 10 1866. If this is correct I must
be really a fine old chap
because before 1866 & 1905 is
1149 years

FIG. 61.—LETTER BY A GENERAL PARALYTIC.

Joffroy's symptom is illustrated in the last few lines. The patient was formerly a learned scientist.

During the first stage the patient loses flesh, looks ill and the various physical signs characteristic of the disease become established. Mentally, this stage is characterized by progressive loss of will-power, loss of control of the instincts in the order already described, emotionalism, inability to keep the voluntary

attention fixed on a subject and tendency to the formation of delusions. The patient is absent-minded and forgetful of duties, appointments and even meals ; but he stands the ordinary memory tests fairly well. During the first half of this stage he is liable to be excessively drowsy ; in the latter half insomnia is the rule.

During the second stage the patient becomes unhealthily fat, plethoric and bloated. The naso-labial folds disappear, the face becomes expressionless and the various physical signs well marked, especially difficulty of articulation. The beginning of this stage is marked by deterioration of the latest acquired instincts, the other instincts being subsequently lost. Of active attention there is none, and now instinctive attention gradually disappears. There is no tendency to the formation of new delusions and former delusions become forgotten. The memory will no longer stand the ordinary tests and, little by little, it becomes obliterated.

It is during this stage that fits are especially liable to occur. The second stage of the disease has accordingly been called the ' fat, fatuous and fitty ' stage.

Paralysis of the limbs now sets in and the patient enters the third stage. He is bedridden, wet, dirty and oblivious of his surroundings. Mentation is reduced to the very lowest ebb, and ultimately all that remains is the instinct (or reflex) to take food from a spoon when it is put to his lips. Such food may consist of soft solids for some weeks or even months ; but the time comes when liquid food only can be swallowed. About three weeks later the deglutition reflex is *completely* abolished and death from inanition follows in a couple of days. Rather, however, than allow a patient to die from inanition, I have him tube-fed to the last. This, however, scarcely prolongs life a week.

Clinical Varieties.

Demented Form.—This form is characterized by progressive mental deterioration without any great excitement, exaltation or depression and without prominent hallucinations.

The patients lose their former energy and capacity for work, become forgetful of details and commit errors of judgment. They have some insight into their condition and therefore seek medical advice of their own accord. Not infrequently it happens

that a patient of this nature will enter an institution for the insane as a voluntary boarder.

Deterioration of volition, instinct, emotion and memory take place in the manner already described. The physical signs run the usual course.

Expansive Form.—This includes the cases in which delusions of exaltation predominate, in which the patient, in spite of his tremulous articulation and tottering gait, declares that he never felt better in his life (euphoria), is stronger than he ever was, is able to lift tons and perform unprecedented athletic feats, is the greatest poet, author, musician, artist, orator, financier and crowned head that ever lived. So enormous are his supposed possessions that he is generous to a fault ; it is impossible to keep him supplied with tobacco, for he distributes it freely to all the other patients in the ward. Benevolence is one of the most striking characteristics, not only of this form of the disease, but of general paralysis as a whole.

There is another variety of the expansive form of the disease, in which the patient enjoys a feeling of general well-being and recounts with self-satisfaction all the beneficent and other pleasing incidents of his past life, forgetting all unpleasant details ; but he never develops such bizarre delusions as those above enumerated.

Maniacal Form.—Here we have to deal with cases which, to a casual observer, present the characteristics of a severe attack of acute mania. The patient is wildly excited, noisy, dirty, destructive and dangerous. In addition he exhibits all the characteristic signs of general paralysis, immobile pupils, exaggerated or absent knee-jerks, tremors etc.

These cases are especially liable to remission. The patients make an apparently complete recovery ; the excitement passes off, tremors disappear, and I have seen cases in which even the light reflex and knee-jerk returned, both having been absent during the attack of excitement. Subsequently the patient has several similar attacks which leave him more and more demented. It may be eight or ten years before he has to be permanently cared for in an asylum and his disease reaches its fatal termination. In some of these cases expansive delusions may be associated with the attacks of motor excitement.

It happens occasionally that the excitement attains the intensity and severity of acute delirious mania, with high

temperature, frequent pulse, sordes on the teeth and inability to retain food, the patient passing rapidly into a typhoid state and dying of exhaustion (galloping general paralysis).

Depressed Form.—This variety is almost as frequent as, if not at the present day more frequent than, the expansive form. The patient may have delusions of past wickedness and assert that his soul is lost or that he is ruined; but hypochondriacal delusions are by far the commonest in this variety of the disease. His throat or bowels are obstructed or on fire, his body is made of glass and liable to fall to pieces if any attempt at movement be made; he is so small that he weighs but a few ounces and can get through the keyhole, so big that he cannot pass through the doorway or he is dead and putrefying. As already stated, many of these patients indulge in such grotesque exaggeration of their affliction that there results that curious mixture of depression and exaltation which is peculiar to general paralysis. As with the maniacal form, remission is not uncommon in this variety.

A few of the depressed cases develop delusions of persecution. Such delusions are unsystematized and unlikely to lead to errors in diagnosis.

Stuporose Form.—This is not a common variety. When it occurs volition, instinct and emotion are in abeyance from the first. The patient sits unoccupied in one position the whole day long, never engages in conversation and is 'wet and dirty'. He is not depressed; the stupor gradually gives place to dementia, the patient giving little or no evidence of mentation during the whole course of the disease.

Circular Form.—This variety is also uncommon. There may be an alternation of periods of excitement and depression with or without intervening periods of quietude.

Convulsive Form.—In some cases convulsions are the chief clinical feature of the disease. It occasionally happens that a person, suffering from hitherto unsuspected general paralysis, suddenly has a batch of fits (status epilepticus) with hyperpyrexia and dies. This may be regarded as one form of galloping general paralysis. In other cases the patient has frequent attacks of status epilepticus or frequent isolated convulsions and the disease runs a rapidly fatal course. Under such circumstances he is said to be suffering from the convulsive form of the disease.

Female Form.—In women general paralysis is usually of the demented or depressed variety without much tendency to the formation of delusions. Krafft-Ebing and Régis ascribe this peculiarity to the relative poverty of ideation in women. Remissions are rare.

Juvenile Form.—Many cases have been recorded of general paralysis occurring in congenital syphilitics during the second decade of life. The physical signs differ in no way from those of other cases; but the mental symptoms are somewhat different on account of the patient's mental evolution being, at the beginning of the disease, yet incomplete. The mental symptoms of the earliest cases accordingly resemble those of imbecility rather than those of insanity. Remissions do not occur in this variety.

Tabetic, spastic and amyotrophic forms are recognized by the French school. Apart from the spinal complications, these forms only differ from ordinary general paralysis in that there is an increased tendency for the disease to be of the depressed variety. It is said that, should general paralysis develop in a patient who has suffered for some years from the results of spinal lesions, amelioration of the spinal symptoms results from the development of the general paralysis.

Prognosis.—The prognosis of general paralysis is exceedingly grave. Most of the cases prove fatal within three years; but it is not sufficiently recognized that a few completely recover. The galloping forms of the disease run their course in two or three weeks, or even less. Three to six months is the usual time for the convulsive forms. Cases with alternate excitement and depression seldom last much longer than twelve months. Expansive cases usually reach their fatal termination within two years. In the demented form the cases last rather longer, about two and a half years as a rule, and the depressed cases last from three to three and a half years. The outlook is much more favourable in the excited cases, because these are the most liable to remit. It is not at all uncommon for such patients to live six to ten years before the fatal termination is reached and, during a considerable portion of this time, they may be well enough to do useful work. Many cases of apparent recovery have been recorded in this variety of general paralysis. On the other hand, excited cases which do not remit run a rapidly fatal course.

Some depressed cases are also liable to remission, but this is not as common as in cases of excitement.

In tabo-paralysis and in women the course of the disease tends to be prolonged.

It occasionally happens in general paralysis that the patient develops a large phlegmon, perhaps in one thigh. When this is opened or bursts spontaneously a large quantity of muco-sanious fluid escapes and the progress of the disease is arrested. Vallon and Doutrebente have published two such cases; there is a similar one of twenty years' duration at present in Bethlem* and I know of one other in Vienna.

The prognosis above given for general paralysis refers to uncomplicated cases. The possibility of death from accidents, complications or intercurrent illness must always be borne in mind. In any form or at any stage of the disease life may be suddenly cut short by an attack of status epilepticus or the patient may accidentally choke himself with a bolus of food; and, although suicide is an uncommon mode of death in general paralysis, it is liable to occur in depressed, especially hypochondriacal, cases.

Broncho-pneumonia may be set up by food passing into the bronchi; this is especially liable to happen to those patients who refuse food and have it forced upon them with a feeding-cup instead of an œsophageal tube.

Unless care and cleanliness are used in the treatment of those who suffer from retention of urine and require the passage of a catheter, the course of the disease may be shortened by cystitis, suppurative nephritis and general septicæmia. Similarly unless care be taken in the prevention and treatment of bedsores, an acute fatal septicæmia may develop.

A considerable number of general paralytics die of phthisis and ulcerative colitis, which appear to be endemic in many of our large public asylums, especially, as it seems, those of fairly recent contruction. The tubercular opsonic index of general paralytics is subnormal. Lastly, the disease may be complicated by any ordinary intercurrent affection, such as pneumonia.

Treatment.—Since general paralysis is to be regarded as a hopeless disease, anything in the nature of curative treatment is

* Since the above was written this patient has died and an autopsy been held. The appearances of the brain were in no way characteristic of general paralysis.

out of the question. It is true that numerous attempts have been made, and several authors claim to have ameliorated cases by their own particular mode of treatment. Yet we are bound to confess in the end that the cure for general paralysis has still to be discovered.

At the present day three methods are undergoing their trial: the first is treatment with urotropine, the second is intensive mercurialization and the third is Dr. Ford Robertson's serum treatment.

We owe the urotropine treatment to Dr. Townsend, who discovered it accidentally. I have tried giving ten grains of urotropine three times a day to all my general paralytics since Dr. Townsend published his paper, with the result that seven out of thirty-four have been discharged recovered and have not returned to Bethlem, whether *post* or *propter hoc* I know not. On the other hand, the drug has in some cases appeared to make the patient deteriorate more rapidly.

Intensive mercurialization is in vogue with the French school. They inject daily, into the subcutaneous tissues, three to six centigrammes of the benzoate or cyanide of mercury. Marchand injects two milligrammes of biniodide of mercury and two centigrammes of iodide of potassium into the spinal canal. Others give intravenous injections of the cyanide of mercury. Encouraging results are said to have been obtained.

Dr. Ford Robertson prepares and uses an antiparalytic serum. Should he be successful, his treatment will, of course, supplant all others. I have no experience of it, but it is said to have done good.

Continued blistering of the head and neck is reported to have been successful in some cases. Temporary amelioration is recorded in almost every case in which trephining and draining have been employed and in seven cases the patients are said to have been cured. Other patients have developed meningitis, since permanent and slow drainage cannot be maintained without danger of sepsis.

In general, however, the present-day treatment of general paralysis is symptomatic. The patient is well fed, preferably overfed, on a liberal, nutritious, minced diet with plenty of milk. Alcohol is withheld and plenty of rest and sleep are given with the aid, if necessary, of sedative draughts.

Motor excitement may be treated with prolonged baths as in the case of an ordinary attack of acute mania. Any tendency to

convulsions may be combated with bromide of potassium, chloral hydrate or, in status epilepticus, with a hypodermic injection of morphia. A drop of croton oil is sometimes useful in cutting short an apoplectiform attack.

Retention of urine should, of course, be treated by the regular use of a clean aseptic catheter. Bedsores are to be prevented by keeping the patient clean and dry. Should they occur in spite of precaution, they must be first rendered aseptic by the use of turpentine fomentations and subsequently painted with several layers of the compound tincture of benzoin.

Morbid Anatomy.—The most striking feature of the morbid anatomy of general paralysis is the diffuseness of the lesions. Almost every organ of the body, on careful examination, shows some degenerative change, so that no doubt exists in the mind of the pathologist that the disease is of toxic origin.

The calvarium, on removal, is found to be thickened, the diploë being obliterated, especially in its anterior part (hyperostosis); as a result, it is two or more ounces heavier than is natural. Much less frequently the bones of the skull are thin and the diploë well marked (rarefying osteitis). Hyperostosis is not often observed elsewhere. Rarefying osteitis is occasionally observed in the long bones. In such cases an abnormal brittleness of the bones may have been a clinical feature during life and at the post-mortem the ribs may be broken like a biscuit between the fingers.

There is almost invariably hypostasis and œdema of the lungs and there may be foci of broncho-pneumonia. Well-marked atheroma aortæ occurs in about 35 per cent. of the cases and slight atheroma or endarteritis in about 80 per cent. In the heart atheroma of the mitral valve is fairly common; the muscle is pale and flabby and, if a portion be teased out in osmic acid, fatty degeneration can usually be determined under the microscope. Some fatty degeneration can frequently be observed in like manner in the liver and there is occasionally some cirrhosis. Slight parenchymatous nephritis, or at least granular degeneration of the renal cells, is also common. D'Abundo states that vesical and prostatic lesions are of frequent occurrence.

But the most striking lesions of all are those of the nervous system and meninges. The dura mater is thickened and adherent to the calvarium, especially along the sagittal suture. In some cases it is lined with a false membrane varying in thickness

up to ⅛ inch and consisting of an organized clot of blood which has escaped from degenerate vessels of the dura mater. The membrane grows in thickness owing to degeneration and rupture of newly-formed vessels in the membrane, thus forming a fresh layer of blood which in turn becomes organized into another layer of membrane. This process may be repeated several times. Calcareous plates are sometimes found in the substance of both the cranial and spinal portions of the dura. The arachnoid is thickened and opalescent. Where it bridges over sulci it shows milky spots and streaks along the course of small vessels. The Pacchionian bodies are increased in number and hypertrophied. The pia mater is thickened and œdematous, its meshes being distended with pale yellowish fluid. There is also a great excess of cerebro-spinal fluid about the base of the brain and in its dilated ventricles.

This excess of fluid is contingent upon loss of cerebral substance by wasting; the brain commonly weighs about 44 ounces or less instead of the normal weight, 48 ounces (male). On stripping the pia mater from the convolutions and dissecting the brain much fluid escapes, so that it commonly happens that the dissected brain weighs 3 ounces less than on removal from the body. The left cerebral hemisphere weighs less than the right, thus giving evidence that it, being the more voluntary, more highly evolved and therefore more unstable hemisphere, suffers from the morbid process more than the right hemisphere, its inferior brother.

On attempting to strip the pia mater from the cerebrum small portions of brain substance from the summits of the convolutions remain adherent to the membrane, leaving small lacerated areas on the cortex (decortication). This feature is absolutely characteristic of a general paralytic brain, provided that the interval between death and the autopsy is not much prolonged. It is said by some to be due to rapid post-mortem softening of the grey matter.

The convolutions are wasted and the sulci widened in consequence and the grey matter is seen on section to be thinner than natural: these characters are most marked in the anterior half of the cerebral convexity. The white matter on section is shiny owing to excess of fluid; puncta cruenta are well marked on account of dilatation of vessels and the perivascular spaces are sometimes visible to the naked eye in the more superficial

parts of the white matter. Some cases, which during life have been subject to apoplectiform attacks, are found at the autopsy to have small foci of softening in the optic thalamus.

The ventricles are dilated and their ependyma frequently presents a granular, frosted aspect, which has been compared to the appearance of the ice-plant. This is best seen, when present, in the floor of the fourth ventricle.

Histological Changes.—Since the sequence which an author adopts in describing the microscopical appearances depends upon his own interpretation of the changes, a preliminary consideration of various views as to the nature of the disease may not be out of place.

For many years pathologists have ranged themselves on opposite sides, according as they hold the view either that general paralysis is primarily an inflammatory or a degenerative change in the cerebral cortex. Such a discussion need not detain an unbiassed observer, for it resolves itself at bottom into a mere quibble about words. If by inflammation we mean 'the reaction of a tissue to injury which is insufficient to destroy its vitality'; then, as we shall see, inflammatory processes are certainly at work in the cortical meninges, neuroglia and bloodvessels. On the other hand, we shall also see reason for supposing that the cortical neurons may undergo primary degeneration, although at the same time subjected to processes causing secondary degeneration. Our contention is, then, that both schools of pathologists are right.

The question whether the neural degeneration is primary or secondary to changes in the glia, bloodvessels and perivascular canals may be similarly answered. It is unlikely that such unstable elements of the cortex as the neurons would escape primary degeneration while neighbouring mesoblastic elements are suffering from the morbific influence of a toxic environment. On the other hand, it will be seen that the morbid changes in the mesoblastic elements are more than sufficient to interfere with the nutrition and to cause secondary degeneration of the neural elements.

The earliest change takes place in connection with the vascular (blood and lymph) systems of the cortex. The vessels of the pia become distended with blood and there is nuclear proliferation in the walls of the arterioles and perivascular canals. There is overgrowth of the endothelial cells of the capillaries, and, on

their adventitial sheath, which normally consists of elongated cells, there develops a regular felt-work of similar cells having special characters (plasma-cells). In this situation they are peculiar to general paralysis. They lie at right angles to the cortex; they have traces of protoplasm at both ends and a clear centre containing very minute granules which stain with

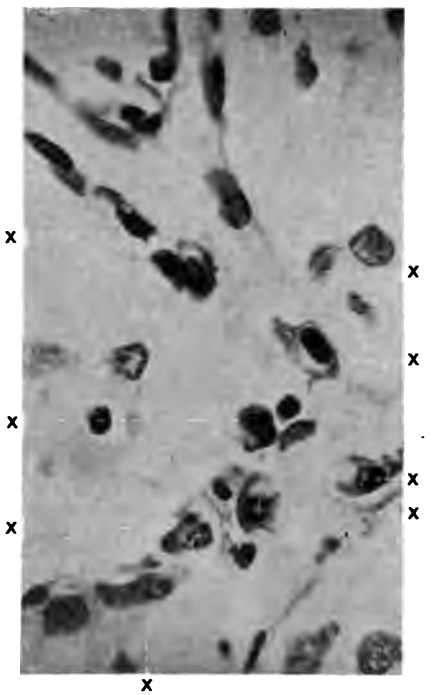

FIG. 62.—A SMALL CORTICAL VESSEL IN THE OCCIPITAL LOBE OF A GENERAL PARALYTIC, SHOWING TYPICAL PLASMA CELLS (x) UPON IT.

Note the oblong, angular or oval shape with a clear space in the cytoplasm and the laterally-situated nucleus with its darkly stained chromatin bodies (× 800). [Negative kindly lent by Dr. John Turner.]

methylene blue and the nucleus is seen in transverse sections to occupy an eccentric position. By some these 'plasma-cells' are regarded as altered leucocytes, by others as derivatives of glia-cells. The latter view seems untenable, because similar cells may be found in the perivascular tissues in almost any focus of chronic inflammation in any part of the body. Nor is the

view that the 'plasma-cells' are altered leucocytes easy of acceptance, for they bear no resemblance to leucocytes. Their resemblance to normal cells of the adventitial sheath is, on the other hand, somewhat striking, and suggests a more probable source of origin. I note in Allbutt's 'System of Medicine' (Art., 'Inflammation')that Professor Adami also holds this view.

Meanwhile there is diapedesis of leucocytes into the perivascular spaces which become further choked by hyaline débris,

FIG. 63.—A GLIA OR SPIDER CELL FROM THE CORTEX OF A GENERAL PARALYTIC'S BRAIN.

The stout, vascular fibres ending in fan-like expansions by which they are attached to the walls of the blood-vessels are well shown. A film preparation (× 600). [Negative kindly lent by Dr. John Turner.]

probably derived from degenerate nerve-cells. Mast-cells are also present, connective tissue leucocytes with basophile granules. This choking of the perivascular canals, associated with thickening of the capillary walls, causes great interference with nutrition of the neural elements of the cortex.

The neuroglia undergoes proliferation. The spider-cells are especially numerous, not only in their normal situations, but also in the deeper layers of the cortex where normally they are not

to be found. Some of the new-formed spider-cells become three or four times the normal size (monster-cells).

Overgrowth of the neuroglia is also responsible for the granular appearance of the ventricles already described. Karyokinetic figures are occasionally observed in the nuclei of the glia-cells. Many of the cortical nerve-cells become strangled by the overgrowth of neuroglial fibres.

It has been demonstrated by Dr. Bevan Lewis that some of these spider-cells in the neighbourhood of a perivascular canal have

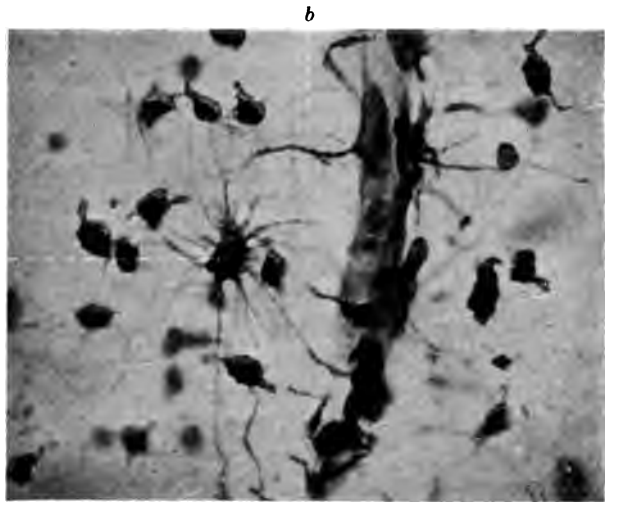

FIG. 64.—SPIDER CELLS IN THE INNERMOST CORTICAL LAYER FROM THE BRAIN OF A CASE OF CHRONIC INSANITY, SUBJECT TO EPILEPTIFORM SEIZURES AND WITH A PROBABLE HISTORY OF ALCOHOLIC INTEMPERANCE.

a = Spider cell, with many branches, one of which is attached to a vessel; *b* = vascular attachment with fan-shaped expansion on vessel (the cell to which this branch belongs is out of the field of section) (× 600.) [Negative kindly lent by Dr. John Turner.]

one process longer than the others, with its end expanded and closely applied to the perivascular lymphatic. It has been inferred that such cells assume a migratory function and serve the purpose of scavengers by absorbing the effete products of neural degeneration and excreting them into the perivascular spaces.

As a result of these three morbid processes (intoxication, disturbance of nutrition by interference with the circulation of blood and lymph in the cortex, strangulation by the over-

growth of neuroglia) there is extensive destruction of the cortical neurons. The earliest destruction of nerve-cells takes place in the physical basis of the most highly specialized functions, especially in the motor centre for speech, but it is best studied in the large cells of Betz in the mid-Rolandic area.

Chromatolysis is the first change: the chromatic granules become powdery and ultimately disappear. The fibrous achromatic substance then suffers (achromatolysis) and the nucleus loses its central position, becomes displaced to the periphery and finally extruded. The nucleus, which normally remains unstained in preparations by Nissl's method, takes the stain in degenerate nerve-cells; while the nucleolus does not take the stain as well as in a normal specimen.

In sections prepared by Cox's method it may be seen that there is a deficiency of gemmules on the protoplasmic processes (dendrons) and that they are replaced by localized thickenings or varicosities.

Lastly, on the death of the cell-body, there is degeneration of its axon. Degeneration of the pyramidal fibres may be demonstrated in the white matter and in the spinal cord by Orr's modification of Marchi's method. According to Orr and Cowen the degeneration is most marked in patients who have during life suffered from convulsions.

The tangential layer of fibres is atrophied.

Bianchi mentions atrophy of the nerve-fibres of the cerebellum and Roecke has described an increase of the fibres of Bergmann in the molecular layer of that organ.

All the cranial nerves show degenerative changes by the Marchi method, many of the medullary sheaths being studded with little black patches. Vassale has pointed out that degeneration of this nature is characteristic of a primary lesion of the fibres from the direct action of a toxin and is not of the nature of a Wallerian degeneration dependent upon lesions of the cranial nuclei.

Degeneration of the column of Burdach is common, as seen in Weigert-Pal preparations, not only in tabetic cases but also in many others which have not shown tabetic symptoms during life. The central canal of the cord is filled with nuclei in some places and distended in others. The anterior and posterior spinal roots usually show signs of primary degeneration.

If a comprehensive view be taken of the lesions above described,

it will be seen that the parts of the nervous system which suffer most are those which are most accessible to the cerebro-spinal fluid:—the dura mater and pia arachnoid; the cortex, especially the motor cortex, with its abundant supply of perivascular lymphatics; the tangential fibres; the cranial nerves and spinal nerve-roots; the walls of the ventricles, especially the floor of the fourth ventricle over which every drop of cerebro-spinal fluid must flow on its way from the choroid plexuses to the foramen of Majendie; the central canal of the cord; the pulvinar and the cortex of the cerebellum. The tract degenerations in the interior of the central nervous system are all secondary to these lesions. The conclusion appears to be irresistible that the specific toxin of general paralysis is to be found in the cerebro-spinal fluid and that it is already present when that fluid is secreted from the choroid plexuses.

Now although this fluid has been the object of most careful chemical and histological examination, the toxin appears to have hitherto eluded observation: it is possible that it is of bacterial origin, as suggested by Dr. Ford Robertson. There is excess of albumin and nucleo-proteid; and cholin, one of the products of degeneration of nervous tissue, is to be found in the fluid. Cholin is a substance known to be capable of both lowering the blood-pressure and inducing fatty degeneration of tissues. It may therefore be held responsible for the extensive fatty degeneration found in patients who have died of general paralysis and also for the lowered blood-pressure, reported by Dr. Craig, in the terminal stages of the disease. Dr. J. Turner found pyrocatechin to be deficient in lumbar puncture fluid of general paralysis and ascertained that it entirely disappeared post-mortem. It occasionally happens that the fluid coagulates shortly after it has been collected, quite apart from any admixture of blood from subdural hæmorrhage or otherwise.

The pressure of the cerebro-spinal fluid is abnormally high. Schaeffer made fifty-three punctures in twenty-five cases and found an average pressure of 182 millimetres; in two-thirds of his cases the pressure was between 250 and 280 millimetres, whereas the normal pressure is certainly less than 150 millimetres.

For cell changes in the cerebro-spinal fluid see Fig. 64 and Appendix B.

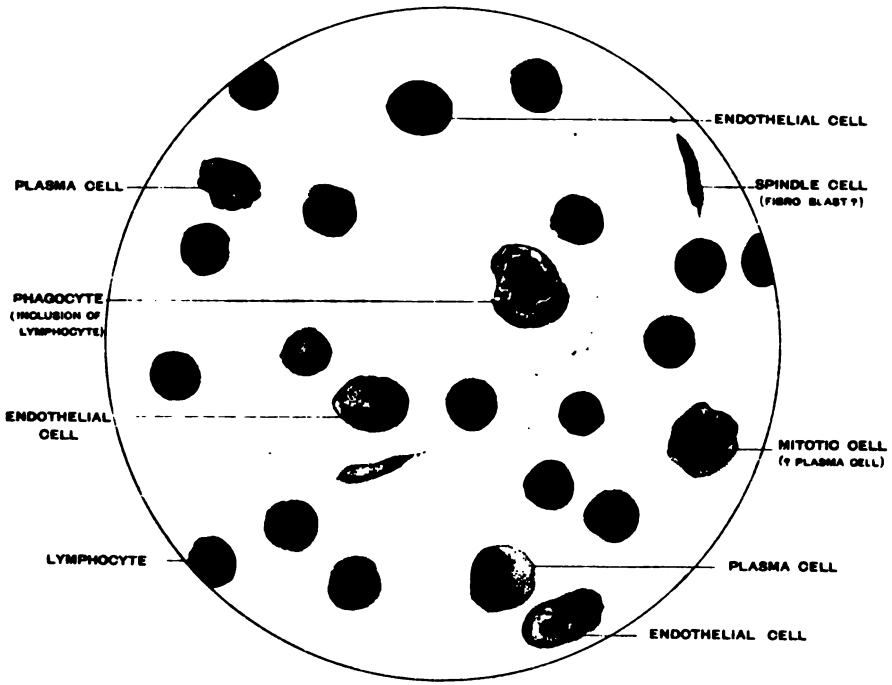

FIG. 65

FILM MADE FROM THE CEREBRO-SPINAL FLUID OF A GENERAL PARALYTIC

STAINED WITH PAPPENHEIM'S PYRONIN-METHYL-GREEN

Preparation and Drawing by Dr J. G. PHILLIPS

CHAPTER VII.

EPILEPTIC INSANITY.

EPILEPSY is a disease characterized by occasional, sudden, excessive, rapid local discharges of the cortical grey matter. This definition, which owes its origin to Dr. Hughlings Jackson, requires but little explanation. That the discharges are sudden, excessive and rapid must be obvious to everybody who has witnessed an epileptic fit. The epithet 'occasional' was introduced into the definition in order to exclude discharges which are not occasional, such as the 'interrupted continuous' discharges of chorea; and the epithet 'local' is justified by the fact that, while the characters of an epileptic fit differ in different cases, they resemble one another in the same case. Each individual patient invariably experiences the same aura and invariably falls on the same spot of his body, *e.g.*, the forehead or the occiput. With those whose fits are ushered in by a cry, the cry is invariably of the same character for each patient; and if the tongue is bitten, it is in exactly the same spot in each successive fit. Lastly, and this is the point which most concerns those who have to deal with mental disease, if the patient is liable to an attack of mental disturbance before or after each fit, the nature of the mental disturbance is the same in successive attacks.

Etiology.—By far the most common cause of epilepsy is hereditary predisposition. Kraepelin obtains a history of nervous disease in no less than 80 per cent. of his cases and of epilepsy in the parents in 25 per cent. Epileptics almost invariably have some stigmata of degeneration. Cranial and facial asymmetries, deformities of the palate and ears, microphthalmos, microcephaly and prognathism are among the most common malformations.

Alcoholism in the parents is commonly believed to be one of

the causes of epilepsy. Such a belief involves the acceptance of the doctrine of heredity of acquired characters. The more correct view of the matter probably is that the inclination to intemperance is a sign of neurotic tendencies. It is more certain that alcoholism in the patient may give rise to epileptic fits.

Seventy-five per cent. of the cases begin before twenty years of age and 16 per cent. between twenty and thirty. Males and females are equally liable to the disease, except in later life when the incidence is rather greater in males.

A certain number of cases date from some head injury or are dependent upon some cerebral lesion of vascular or syphilitic origin. Under this heading are to be reckoned the epilepsies due to ' birth palsy '.

Scarlet fever appears to be responsible for a few cases, the first fit occurring in the course of or immediately after an attack of this disease. Predisposition is probably the most potent factor in the causation of these cases and also of those which are ascribed to irritation arising from normal dentition, carious teeth or intestinal worms.

Epileptic insanity rarely, if ever, develops before the epilepsy has been of long standing and patients often retain their full mental vigour although they have been subject to fits for many years. Julius Cæsar, Mahomet, Peter the Great and Napoleon I. are the usual classical examples, but in all of these cases the fits appear to have been rather infrequent.

The main factor which determines the incidence of epileptic *insanity* appears to be frequent recurrence, rather than severity of the convulsions ; indeed, it has been pointed out by many authors that insanity is more liable to occur in patients who are subject to attacks of minor epilepsy than in those who suffer from major epilepsy only. It is said that insanity is liable to develop soon in cases in which epilepsy begins late in life.

Psychical Stigmata. — Before proceeding to describe the epileptic attack let us consider the general character of the insane epileptic.

Aschaffenburg has asserted recently that the specific feature of the epileptic character is periodic fluctuation of affective tone. Emotional instability we have already seen to be a frequent symptom of many forms of insanity ; the characteristic of epileptic emotivity is periodicity.

Now it has been pointed out over and over again in the

present manual that instincts and emotions are practically the same thing and that they suffer together and in the same way in mental dissolution. So it is in epilepsy. Broadly expressed, we should say that the essential feature of the epileptic character is that there is a periodic loss of volitional control of the instincts and emotions. In other words, the pyramidal system periodically fails to control the cortico-rubral system.

This characteristic frequently shows itself in childhood before the appearance of any convulsions. The child is liable to uncontrollable fits of weeping and passion without cause and of such great severity that he will even throw himself on the floor and go blue in the face. At school he is suspicious and easily offended. He becomes captious and irascible and it is soon discovered that his instincts are of the baser sort. He is vindictive and cruel.

At adolescence the sexual instinct is uncontrolled and the patient takes to masturbation or commits other unnatural sexual offences. His instincts are criminal, a fact recognized by the prison authorities who make ample provision for epileptics, in the form of padded rooms etc. in all the larger prisons.

With the incidence of manhood the epileptic usually realizes that he is different from his fellows and he becomes on the one hand a hypochondriac and on the other a hater of his race. There is a rise of the egoistic sentiments and decline of the altruistic. He tries to get others into trouble and to obtain sympathy for himself. Hence we find that it is in the epileptic ward that most of the charges of cruelty to patients have to be investigated; for example, a patient accuses an attendant of having struck him and exhibits a self-inflicted bruise to substantiate the charge. The conduct of the epileptic is peculiarly brutal and ferocious; if he is offended, he reacts with wholly disproportionate violence, and murder is one of his instincts.

The remarkable degree of religiosity of the epileptic appears at first sight to be paradoxical to such a character as I have portrayed. Night and morning he reads his Bible, sings hymns for all to hear and, like the typical Pharisee, falls upon his knees in prayer at inopportune moments and in public. This religiosity, for it is not religion, is all outward show; it is a lambskin concealing the wolf beneath. A few epileptics however, are, good-tempered when at their best and will assist the attendants in nursing the more troublesome patients.

Preparoxysmal Stage. — When an insane epileptic is about to have a fit an experienced attendant is usually able to detect a characteristic change in the patient's conduct for a couple of days or so before the convulsion. He is restless and sleepless and his customary impulsiveness is exaggerated. He may become bad-tempered, gloomy and unable to follow his usual asylum occupation; he may be suspicious with delusions of persecution or elated with delusions of grandeur or a true maniacal attack may be observed.

Prodromal Stage.—This stage lasts from a few seconds to three minutes previous to the onset of the fit. It is in reality the beginning of the convulsion and is characterized by the appearance of the aura or warning, which is usually of a sensory nature. Warning does not come in all cases and is less common in insane than in sane epileptics.

The epigastric aura, which consists of a feeling of oppression in the epigastrium, is the commonest. Some patients describe the sensation as travelling from the epigastrium up to the throat or into the head. Visual auræ consist of hallucinatory apparitions of people, either singly or in crowds, motionless or in movement. One patient used to see his own face, and address it: 'Hallo, Fred! Is that you?'. Other patients experience visions of angels in the heavens or devils in hell. Frequently the hallucinations are less complex and appear as stars, sparks of fire or coloured lights.

Auditory auræ are less common and when they occur are usually crude, such as whistling or hissing in the ears, a crash or a crack inside the head. Occasionally the aura consists of music or the ringing of church bells; such complex hallucinations suggest the possibility of a coarse lesion in the temporal lobe. Gustatory auræ are not very common: they are usually unpleasant and accompanied by champing movements of the mouth. Olfactory auræ are rather more common: when present, the patient experiences an unpleasant odour, usually of something burning, chemical fumes or decomposing animal matter. Dr. Hughlings Jackson has pointed out that the olfactory aura is frequently accompanied by a 'dreamy' state in which the patient has a sense of unreality of his surroundings. Occasionally the aura is motor, the patient running a short distance or turning round two or three times before falling unconscious in a fit. Other premonitions are a sense

of fear, shivering, vomiting and an increased flow of saliva or sweat.

A motor aura must obviously be regarded as the very beginning of the motor convulsion. Sensory auræ give a clue to the site of the discharging focus in the cortex. I have suggested that, in some cases, the physical basis of a premonitory hallucination may be the last part of the sensory cortex to be affected. Thus, a patient suffering from the epigastric aura is on the road to unconsciousness, otherwise loss of sensation; and my suggestion is that, during the aura, loss of sensation has already begun in the limbs and that the epigastrium dominates consciousness because it is the last region to become anæsthetic.

The Convulsion.—Simultaneously with the loss of consciousness the pulse becomes feeble and occasionally ceases altogether during the early part of the tonic stage, the face grows pale and the patient falls to the ground convulsed. The march of the spasm is so rapid that it is impossible to say which is the first muscle affected. To all appearance every muscle in the body contracts vigorously at the same moment. There is, to use Dr. Jackson's phrase, a 'clotted mass of movements'. That there *is* a definite order of spasm is obvious from the fact that different patients fall in different ways and each patient falls in the same way in successive fits.

As a rule the spasm is stronger on one side of the body than on the other so that the head, eyes and mouth are drawn to one side. Should the contraction of the chest muscles happen to coincide with closure of the glottis, as it frequently does, a peculiar cry occurs as the patient falls. The elbows and wrist are slightly flexed and the hands clenched upon the thumbs; the lower limbs are commonly extended. The face becomes cyanosed owing to fixation of the chest. Urine is voided with such force as to indicate that the bladder muscles are involved in the spasm. This condition of affairs which is known as the 'tonic stage', lasts about half a minute, at the end of which time the muscles momentarily relax, at first every few seconds, then more and more frequently. These relaxations become more and more prolonged and the intervening spasms shorter. In this which is known as the 'clonic stage', the convulsion appears as a series of jerks or spasms involving the whole body. At first the jerks are due to momentary synchronous relaxations and later to momentary synchronous contractions of all

the muscles of the body. It is usually in this stage, which lasts about one minute, that the tongue is bitten. An onlooker has therefore sufficient time to obtain a tongue-depressor, spoon or similar implement and prevent this accident by sliding, for example, the handle of a spoon between the teeth on the first relaxation and depressing the tongue until the convulsion is over.

Some patients are liable to a series of five, ten or more up to 200 such fits without recovering consciousness in the intervals (status epilepticus). In this condition the temperature usually rises three or four degrees and the patient is reduced to a state of extreme exhaustion which may terminate fatally.

During a convulsion all the superficial and tendon reflexes are in abeyance and cannot be obtained. After the fit the patient is exhausted and commonly sleeps for a quarter of an hour or so. This sleep is to be regarded as analogous to the local paralysis which occurs after a local fit arising from a lesion of the precentral gyrus. It is temporary universal paralysis. That this exhaustion is not only of the cerebral cortex, but also of lower nerve centres, is shown by the fact that in most cases the knee-jerk is diminished or absent.

Defendorf reports that he made 1,088 observations on the state of the reflexes after epileptic fits. 'The normal plantar reflex (flexion of the toes, etc.) was present in both feet immediately after clonus had ceased in 45 cases, and in one hour later in 226 cases; the Babinski phenomenon (extension of toes with dorsiflexion of ankle) occurred in 103 cases directly after seizure, and in 112 cases one hour later. An extensor response was found in right or left foot in 99 and 53 cases respectively, and a flexor response in right or left foot in 99 and 211 cases respectively; while a mixed response, that is, extension in one foot and flexion in the other, occurred in 82 cases directly after a seizure, and in 147 cases one hour later. The plantar reflex was abolished in 660 cases immediately after the convulsion, and in 339 cases one hour later. The knee-jerks were active in 396 cases, moderate in 137, and absent in 539 cases.'

Epileptic attacks usually occur at intervals of two or three weeks, but their frequency varies enormously. One patient of mine, not insane, has had four convulsions in about twenty-five years. Another, also not insane, who had been subject to

attacks about once a month, had no fit for ten years, during which time she had taken bromide regularly. She then ventured to leave off her bromide and at once had a fit.

Brown-Séquard had a patient who had fits nightly for seventeen years and an average of twelve nightly for ten years.

Many patients are liable to batches of fits, not status epilepticus; they have five or ten fits in the course of two or three days, go a couple of months without any attacks, then have another batch and so on.

Not all epileptic attacks are as severe as the major attack above described. Sometimes muscular spasm occurs of such brief duration that it is unobserved by an onlooker, sometimes it lasts just long enough to be noticeable. In other cases the patient perhaps experiences an aura, momentarily loses consciousness and lets some object in his hand fall to the ground or even falls himself; but the attack appears to be unaccompanied by muscular spasm. All these cases are classed as 'minor epilepsy' or *petit mal*. As Dr. Jackson has pointed out, the physical basis of such attacks is in the functionally highest regions of the cortex which we now call 'association areas'; and it is because the disorder in these cases is of the areas which constitute the physical basis of mind that minor epilepsy is especially associated with and liable to induce insanity. These minor attacks receive various names in popular parlance. Sometimes they are spoken of as 'faints', a term which will mislead only the most casual practitioner. Among asylum attendants they are usually called 'sensations'.

Post-Epileptic Automatism.—It is especially after these minor fits that the condition known as post-epileptic automatism is likely to occur. The patient has a minor attack and immediately proceeds to perform some apparently purposive action of an irrelevant nature. For example, he may proceed to undress in the public street, perhaps, as Sir William Gowers suggests, on account of some vague sense of indisposition and the propriety of going to bed. Many instances of this condition have been recorded. 'One man drove a waggon across London, and found himself six miles from the place where he was, as it seemed to him, a moment before' (Gowers). A bank clerk was sent a message to another bank, having entered which, he knocked a clerk off his stool, disarranged some papers but removed none and left the bank. Subsequently he remembered nothing of the incident

except experiencing his usual epileptic aura on ascending the bank-steps. Then there is the classical case of the French judge who, after an attack of *petit mal* which occurred during a trial, micturated in the corner of his court before the public gaze, an incident of which subsequently he could recollect nothing. Occasionally however these post-epileptic states are remembered by the patient. A man, who worked in a ship-yard and had for some years been subject to attacks of 'giddiness' with increasing frequency, went to the yard as usual one morning, worked for half an hour, then went and sat on a piece of timber. His comrades spoke to him but could get no answer, so he was taken to hospital. While there he would say nothing except the Lord's Prayer, in reciting which he showed some difficulty of articulation. After a sojourn of a few days he was transferred to an asylum where he became almost immediately his normal self and was able to recount all that had happened to him in hospital, knew the names of the doctors there and related incidents which occurred during demonstrations of his case to the students. After a few days he relapsed and became an ordinary case of epileptic insanity.

Epileptic Equivalents.—States of automatism similar to the above sometimes occur independently of epileptic convulsion, major or minor. Such states are then regarded as substitutes for epileptic fits and are known as 'epileptic equivalents'. Of these there are two varieties, the transient and the protracted. Both are almost always, but not invariably, characterized by subsequent loss of memory of the events which have taken place during the attack.

The transient equivalent lasts from a few seconds to a few hours, rarely longer, and consists of an isolated impulsive act usually of a violent nature. One form of impulse is the 'epileptic flight', in which the patient runs for ten or even twenty miles as if impelled by an irresistible force and perhaps strikes anybody who happens to be in his way. With some patients the flight takes place to the same spot in successive attacks. More commonly the impulse consists of a violent, occasionally murderous, attack. In other cases the criminal impulse is of a less violent nature, such as indecent exposure, arson or theft. Not infrequently these transient equivalents are immediately succeeded by such post-epileptic phenomena as headache and sleep.

Protracted equivalents last from a couple of days to two months. These are the attacks of true epileptic insanity most commonly seen in asylums.

Under this heading we have to consider :

Epileptic depression or ill-humour ;
Epileptic excitement ;
Epileptic confusion ;
Epileptic delirium ;
Epileptic stupor (so-called epileptic katatonia) and
Epileptic automatism.

In *epileptic depression* the patient is dominated by a feeling that his surroundings are hostile. The condition resembles melancholia in which the patient explains his incapacity as being due to an increase of the resistance of his environment. He is irritable and querulous. He complains of everything, of the inferior quality of his food, of the antagonism of fellow-patients, of cruelty of the attendants and want of sympathy on the part of the doctor. He complains of headache, epigastric oppression, loss of appetite, bowel obstruction and a host of other physical ailments. He threatens or attempts suicide and requires the most careful supervision.

Epileptic excitement is characterized by extreme intensity and severity, such as is rarely met with in other forms of insanity. The aspect of the patient is forbidding ; the face is pale or livid, the eyes staring, the facial expression either absent or indicative of readiness for attack. The movements are impulsive and violent ; the patient makes mad rushes at the attendants or, if restrained, struggles blindly and furiously. This is the classical type of epileptic excitement which has received the name of ' epileptic furor '. The patient is either silent or garrulous and incoherent.

Nevertheless he is not entirely inaccessible ; he can occasionally be induced to answer questions, but immediately relapses into incoherent babble. Criminal acts, such as suicide, homicide and crimes of a sexual nature, are liable to be committed in this condition.

Not all cases however of this epileptic excitement exhibit such passionate fury and violence. Some laugh convulsively, strip, turn somersaults, declaim or address irrational remarks to bystanders or to pictures on the wall. The disorder lasts from a few hours to a couple of days and is one of the states which have

received the name of 'mania transitoria'. As such nomenclature is rather misleading, it is better that the term be allowed to drop.

Epileptic confusion is a remarkable state in which the patient suffers from peripheral anæsthesia, usually of extensive distribution, imperception and disorientation accompanied by aimless wandering and purposeless movements of the arms and legs. The patient cannot understand simple commands or appreciate the nature of his environment (imperception and disorientation). Occasionally a relevant answer can, by persistence, be obtained to simple questions. One patient in a London hospital told me that she knew she was somewhere near the sea because she could hear the sound of the waves; she really heard the noise of the traffic. This patient showed a certain amount of suggestibility. After demonstrating the case to a class of students I suggested that in about a week's time she might possibly hear a crack in her head and suddenly recover. One week later, almost to the very minute, the patient heard a crack in her head and returned to her normal condition. The kudos I then obtained for remarkably clear insight into the patient's malady was ill-deserved. The result was probably to be explained by the patient's unsuspected suggestibility; it could hardly be a coincidence.

The unique case of allocheiria of epileptic origin, mentioned on p. 103, occurred in a patient suffering from epileptic confusion of this nature.

Epileptic Delirium.—The predominant characteristic of this form is the presence of terrifying hallucinations. The patients see devils, animals, fire, blood or infernal machines destined to torture them. They believe themselves to be surrounded by enemies and they attack bystanders with intent to kill them. In some cases the hallucinations have a religious import; God, Christ and the angels appear to them in the heavens and perhaps speak to them. Such hallucinations may induce the patient to sing hymns or fall on his knees in prayer. These patients are completely disorientated and apparently suffer from imperception, but it is difficult to test this point on account of their general dread of everything and their consequent motor excitement.

In *epileptic stupor* there is extensive peripheral anæsthesia and, I believe, contraction of the visual fields. The pupils are dilated and react but feebly to light. The patients stand rigidly in one position, apparently oblivious of their surroundings;

they assume catatoniac attitudes and flexibilitas cerea is not uncommon. Usually they take no notice of external stimuli, but occasionally they resent interference and even strike passers-by impulsively. They are 'wet and dirty' in their habits.

Some of these patients take their food mechanically, others refuse all nourishment and require artificial feeding. Speech is absent or consists of irrelevant detached words and phrases uttered in a tone devoid of emotion ; the patients do not respond to questions, probably in part because they do not understand them (imperception).

Epileptic Automatism.—In this state patients may commit extravagant acts similar to those mentioned under the heading of post-epileptic automatism. Not infrequently however they behave in an apparently normal and rational manner so that their condition is unsuspected. They perform unpremeditated complex actions of which they have no subsequent remembrance. The patient may forget his own name and even change his identity (double consciousness). The most striking instances are those in which a long journey is undertaken, the case being then reported in the lay press as a 'mysterious disappearance'.

Legrand du Saulle has related the case of a merchant who, on recovering from his attack, found himself on the way to Bombay. Dr. W. S. Colman has told me of a guardsman, quartered in London barracks, who suddenly heard a crack in his head and found himself in Newton Abbot, having unintentionally absented himself without leave. Perhaps the most remarkable case of all is that of the Rev. Ansel Bourne, mentioned by Professor James. This patient, who was an itinerant preacher, disappeared on January 17, 1887 and did not recover until March 14 of the same year when he found himself keeping a confectioner's shop under the name of A. J. Brown in Norristown, Pennsylvania, 200 miles away. During the whole of the attack nobody in Norristown ever suspected that there was anything wrong with the man.

The duration of these attacks of so-called 'psychic epilepsy' is from a few hours to a couple of months. Recovery may be gradual or sudden, sometimes after prolonged sleep. There are cases of sudden recovery in which the patient at the moment of awakening hears a crack in his head. What this crack may be opens a wide field for speculation. The whole period during which the epileptic equivalent lasts is usually covered

by complete, sometimes by partial, amnesia. Occasionally, on the other hand, the patient can remember everything that has occurred, as in the case of epileptic confusion above cited.

Narcolepsy, a condition of deep sleep lasting sixteen to twenty hours, sometimes occurs as an epileptic equivalent. It is followed in some instances by mild attacks of excitement.

Post-Epileptic Insanity.—After an epileptic has had a convulsion he is liable to attacks of mental disorder differing in no way from the epileptic equivalents above described. The question arises whether the so-called equivalents are not invariably preceded by an attack of *petit mal*, so slight as to escape observation. I am convinced that this is so in a large number of the cases. Whether it is always so is a matter which, in all probability, can never be definitely settled.

Epileptic Dementia.—In the course of time the repeated convulsions and attacks of true epileptic insanity begin to leave their permanent mark upon the patient's mentation and he becomes weak-minded. At first there is poverty of ideation, fallacious judgment, faulty memory, emotional instability and deficiency of moral tone. He is cruel to other patients and deceitful to doctors and attendants. He is irritable, vindictive, malicious and liable to unprovoked outbursts of anger. His look is uncertain, furtive and ' metallic '.

His vocabulary becomes so impoverished that he has to express himself in circumlocutions. In narrating incidents he wanders off in long digressions and enters into unnecessary detail. On the other hand, he has difficulty in understanding the language of others (imperception).

When dementia becomes more pronounced the patient is completely disorientated in time and place, imperception is complete and memory annihilated. He sits huddled up in a corner of the ward, wet and dirty and leads a purely vegetative existence.

The dementia may be as profound as that produced by general paralysis. Anæsthesia of the hands is not uncommon in this condition. Nystagmus may occasionally be observed.

The general disposition of epileptic dements is morose and suspicious and a few develop systematized delusions of persecution. Hallucinations are rather uncommon.

Prognosis.—The earlier the age of incidence of epilepsy, the graver the prognosis. Children who develop epileptic fits before the age of seven are destined to become epileptic idiots incapable

of education. This matter is dealt with in another part of the book.

The more frequent the convulsions and the longer the duration of the disease, the smaller is the probability of permanent recovery and the greater the probability of subsequent insanity. According to Gowers, the prognosis is better when the attacks are limited to either the day or night than when they occur in both sleeping and waking states.

Attacks of minor epilepsy are of grave significance because they are more difficult of arrest by treatment than major attacks and because minor attacks are more liable than major to become associated with epileptic insanity.

The prognosis of epilepsy is unfavourable when the disease is induced by cerebral injury or a scar of some former cortical lesion.

More important than any of the above factors in the prognosis of the disease is the treatment. This depends very largely upon whether the circumstances of the patient will allow of treatment being satisfactorily carried out. *Cæteris paribus*, if, during the early stages of the disease, the attacks are completely arrested by treatment for a period of two years, the chances of recovery are fairly good, recovery meaning freedom from attacks without treatment. These remarks apply equally to epileptic convulsions, epileptic equivalents and other forms of epileptic insanity. Even in the early stages of epileptic dementia the beneficial effects of careful treatment (*vide infra*) may be observed. That treatment is useless in advanced dementia goes without saying.

Morbid Anatomy.—The most striking features in the morbid anatomy of an epileptic are teratological anomalies, not only cranial, facial and other asymmetries, but alterations in the modes of convolution of the brain. Further, the microscope reveals defectively developed and, according to some observers, hypertrophied nerve-cells in the cortex cerebri, as well as persistent subcortical nerve-cells, which occur normally in infancy and are also to be found in the brains of idiots.

Focal lesions of all parts of the cortex cerebri, basal ganglia and cerebellum are to be found in many cases of epilepsy and may justly be regarded as the primary cause of the disease ; but in the majority of cases no such lesion is to be found. Sclerosis and atrophy of the cornu Ammonis occur in about 50 per cent. of the cases. This change, however, together with a general thickening of the meninges, infiltration of the perivascular spaces with

leucocytes, increase of neuroglial cells and fibres, chromatolysis with vacuolation of the cortical nerve-cells, degeneration and displacement of nuclei and disappearance or shortening of the protoplasmic processes, is regarded by most pathologists as the result, not the cause, of the disease.

The change described by Bevan Lewis as occurring mostly in the small cells of the second layer merits special consideration. Specimens stained by his 'fresh method' show an unstained bright refractile droplet of oil in the centre of the nucleus of these cells. In more advanced stages of degeneration the droplet is larger and replaces the nucleus. Later on the droplet is discharged and the cell, which still retains its contour, is left in a vacuolated condition. The change described is not peculiar to epilepsy, but Dr. Lewis claims that it is never so marked in other forms of insanity.

Dr. John Turner of Brentwood Asylum has demonstrated in the cortical vessels the presence of blood-clots which stain green with Macallum's phenyl-hydrazin reagent, showing that they contain phosphorus and are therefore of *ante-mortem* origin. Dr. Turner found this intravascular clotting in 90 per cent. of epileptic brains and in only 35 per cent. of control brains. He also points out that the blood platelets are excessively numerous in epileptics.

During the past ten years special attention has been paid by many investigators to the blood and urine of epileptics, with a view to discovering abnormal constituents.

The general results of these investigations are—(1) that, during an interval between attacks, the toxicities of the blood and urine are the same as in the case of a healthy person; (2) that, before a series of fits, the toxicity of the urine is diminished and that of the blood increased; (3) that, during a series of fits or during an epileptic psychosis, the toxicity of the urine is still subnormal but tends to rise, while that of the blood, having been gradually rising for some time, now reaches its maximum and (4) that immediately after an attack the toxicity of the urine is increased, while that of the blood is diminished. Krainsky states that the chief abnormal constituent to be discovered in the blood is ammonium carbamate and he has succeeded in producing fits in animals by injecting defibrinated blood drawn from an epileptic during the course of a paroxysm. The obvious conclusion from these results *per se* is that the epileptic crises are entirely

dependent on some toxin or toxins circulating in the blood-stream. Some authors contend that the beneficial effect of purgatives in diminishing the number of fits indicates that the gastro-intestinal canal is responsible for the manufacture of the toxins. The more probable explanation is that purgatives remove a source of peripheral irritation. It is further stated that the urine of epileptics contains a smaller quantity of chlorides, phosphates and nitrogenous products than that of normal individuals.

A satisfactory explanation of the phenomena of epilepsy has therefore many clinical and pathological requirements to satisfy. It must take account of the facts that epilepsy is associated by heredity with other neuroses and psychoses, that it occurs in subjects with teratological anomalies of the cerebral cortex, that coma and other psychical phenomena are associated with the convulsions, that the convulsions tend to recur, that each fit is an exact replica of previous fits in the same patient, that the patient is, at least in the earlier stages of the disease, perfectly well between the fits and that the occurrence of a fit usually tends, so to speak, to 'clear the air'. It commonly happens that a patient who has been for some days morose, irritable, querulous and suffering from occasional attacks of *petit mal*, suddenly has a severe convulsion, followed by sleep for half an hour or so, and is perfectly well until the pre-paroxysmal period of his next fit. The explanation which we seek must further take account of the occasional cessation of the pulse during the tonic stage of the convulsion and of such pathological findings as widespread degeneration of the cortex, intravascular clotting, sclerosis of the cornu Ammonis, the recurrent formation of toxins in the blood and their almost immediate elimination in the urine on the occurrence of a convulsion. We may leave out of consideration the cases in which there is a definite irritative lesion of the brain.

The problem which faces us is no easy one and the attempt to solve it has given rise to numerous theories as to the nature of epilepsy. The most important are: (1) The theory of cortical instability, (2) the vasomotor theory, (3) the toxin theory and (4) the theory of intravascular coagulation.

The *theory of cortical instability* regards the epileptic as a person whose cortical neurons are so irritable that they occasionally burst into explosive activity from some trivial cause

and give rise to a convulsion. This theory fails to explain the fact that an unstable cortex occasions epilepsy in one person and maniacal symptoms in another, but it is justified in that it recognizes the cerebral cortex to be the seat of the disorder, a fact which is at least minimized, if not totally ignored, by the supporters of the toxin theory. That the physical basis of epilepsy lies in the cortex cerebri is obvious from the study of the family histories of epileptics, from the cortical deformities and from the frequent association of mental disturbance with convulsions. The theory fails however by being incomplete. It throws no light on the nature of the changes in the blood and urine.

The *vasomotor theory* takes account of the fact that convulsions are readily caused by the cortex being suddenly deprived of its normal vascular supply, either by cerebral embolism, ligature of the carotids or severe anæmia from loss of blood. It further takes account of the occasional cessation of the pulse during the tonic stage of a fit, regarding such cessation as a vago-cardiac inhibition to check a continuous rise of blood-pressure induced by a widespread area of vaso-constriction. The view that such vaso-constriction occurs is supported by the observation that inhalation of amyl nitrite is sometimes successful in arresting an attack. One of my patients, who came to me with a history of one fit every day, and also suffered from Raynaud's disease, had her fits entirely arrested by the administration of 10 minims of the tincture of belladonna three times a day. According to the vasomotor theory, epileptic convulsions are caused either by the blood-supply to the cortex being cut off by a local vaso-constriction or by a sudden fall of blood-pressure following a rise caused by a widespread vaso-constriction. The Raynaud's disease cases belong to the former class and the cases accompanied by cessation of the pulse to the latter.

According to the *toxin theory*, the fits are due to periodic accumulation of fit-producing substances in the blood, especially ammonium carbamate. According to this theory, the direct effect of a convulsion is to cause the sudden elimination of toxins from the blood into the urine ; otherwise there seems to be no reason why the convulsion should cease in so short a time.

The *theory of intravascular coagulation* claims that the convulsions are directly due to cutting off the vascular supply to the cortex by the formation of blood-clots within the cortical

vessels. That such coagulation occurs Dr. Turner has conclusively demonstrated and he explains the fact that every fit occurring in any given patient is almost an exact replica of previous ones on the supposition that the character of the fit is determined by the position in the cortex of the imperfectly developed nerve-cells. Dr. Turner correlates the fact that the cornu Ammonis is especially liable to sclerosis and atrophy with the observation that the injection of clove oil into the jugular vein of a rabbit is especially apt to cause hæmorrhages in the same region of the cerebrum.

There seems to be no reason why we should discredit any of these theories. Our view of the pathogenesis of epilepsy will therefore be arrived at by an attempt to reconcile them somewhat after this fashion. The disease occurs in persons with an imperfectly developed cortex cerebri. Owing to the accumulation of toxic products in the blood the vascular supply to the cortex is cut off by intravascular clotting and arterial spasm, these conditions giving rise to convulsion. The direct result of such convulsion is to eliminate the toxins from the blood and to cause the patient to return to his normal health. The instability of the cortex and the formation of toxins can hardly be a haphazard combination of circumstances. We therefore seem to be driven irresistibly to the conclusion that such toxins are manufactured within the nervous system itself.

Treatment.—When the physician is confronted with a case of epilepsy it is his first duty to subject the patient to a most searching physical examination in order to ascertain whether there are, on the one hand, any peripheral sources of irritation, such as eye-strain, an uncompensated heart, indigestion and constipation or, on the other hand, any irritative lesions of the central nervous system which are capable of being localized. Eye-strain should be treated with suitable spectacles; heart disease, indigestion, constipation and similar disorders on general medical principles. Localized cerebral lesions should be first treated with mercury and potassium iodide in case they should be of syphilitic origin. If such treatment fail to ameliorate the condition it may be desirable to resort to surgical measures.

The patient should lead a regular life, keep early hours and live on a plain, nutritious, fattening diet, avoiding excess of nitrogenous food and totally abstaining from alcohol in any

form. Under this régime it often happens that the fits entirely disappear. When I was resident at the National Hospital in Queen Square it was by no means an uncommon occurrence for an epileptic who had been treated as an out-patient on potassium bromide, to be admitted with a history of one fit every day in spite of treatment. On admission bromide was withheld until a fit had been seen and described; the simple life proved to be so beneficial that not a single fit occurred during a month's residence in hospital.

Under this régime a record of the fits should be kept and their frequency noted; three fits a day, one a week or one a month as the case may be. The patient is now placed on bromide treatment, preferably 5 grains each of potassium bromide, sodium bromide and ammonium bromide night and morning and the frequency of the fits again noted. If they are entirely arrested the treatment can be continued for a few years and the dose then gradually reduced; if not, the dose should be increased and the frequency of the fits again noted. In this way the dose should be gradually increased up to the point beyond which no further diminution of the fits is accomplished. As a general rule it is not advisable to go beyond 60 grains of the mixed bromides in the course of the day. A bromide rash may be avoided by the addition of 2 or 3 minims of liquor arsenicalis to each dose of medicine.

If convulsions still persist various adjuvants may now be added to the mixture, borax being the first, beginning with doses of 5 grains and working up to 10 or even 20 grains should it be successful in diminishing the frequency of the convulsions. The maximum dose of the drug is that beyond which no appreciable benefit is obtained.

Now try lactate of zinc, tinctures of digitalis, belladonna and hyoscyamus, chloral hydrate and the liquor morphinæ bimeconatis, always keeping a record of the fits and noting the effect on the patient of the addition of any particular drug. If the drug proves beneficial it should be continued, if useless dropped. Above all things rule-of-thumb methods are to be avoided in the treatment of epilepsy; in no condition is it more important for the physician to bear in mind the rule that he should treat the patient and not the disease.

Hypnotism is said to have proved beneficial in a few cases.

Patients suffering from thirty or forty fits a day require more

immediate and urgent treatment. In such cases the bromides are not very efficacious; chloral hydrate has proved a more useful drug. The best mode of administration is to give repeated doses in sufficient quantity, usually 10 to 15 grains three times a day, to keep the patient asleep, except for meals, for several days, perhaps for a fortnight in severe cases. The bromides may then by degrees be substituted for the chloral hydrate.

Status epilepticus should be treated by giving a hypodermic injection of morphia, about $\frac{1}{4}$ grain, and repeating it in three hours if necessary. A useful adjunct is an enema containing 10 or 12 grains of chloral hydrate, after clearing the rectum as much as possible with a soap and water enema. Occasionally it is necessary to resort to chloroform inhalation.

For those patients who have a definite warning before their fits the inhalation of amyl nitrite is sometimes successful in preventing an actual convulsion. If the warning consists of a sensation in one of the limbs the convulsion may occasionally be warded off by giving a strong sensory stimulus to the limb by tying tightly round it a ligature such as a handkerchief.

Epileptics should be under constant observation for the prevention of such accidents as falling into the fire, drowning in the bath or suffocation by the bedclothes when a fit occurs during sleep. The part of the body on which the patient usually falls should be covered with a pad. In some institutions pillows of reeds instead of flock are used for the purpose of minimizing the risk of suffocation, should a fit occur while the patient is in bed.

All that has been said with regard to treatment applies equally to sane and insane epileptics. I cannot agree with those authors who state that bromide treatment is useless or worse than useless in the treatment of epileptic insanity.

When the convulsions are not too frequent some mild form of outdoor occupation is certainly beneficial. With this object in view, epileptic colonies have been started here and there in order that the colonists may, under supervision, occupy themselves in tilling the land. The system appears to work well with sane epileptics, but its application to the treatment of epileptic insanity, especially by the London County Council, is yet in its infancy. It is therefore too early to make any definite statement with regard to its success.

CHAPTER VIII.

ALCOHOLIC INSANITY.

Etiology.—The determining factors of alcoholic insanity are (1) The nature and quantity of the alcoholic beverage employed and (2) the character of the individual who drinks it.

Several investigators have found degenerative changes in the cortical nerve-cells of animals to which large quantities of ethyl alcohol have been given. We must therefore hold this substance responsible in a large measure for the deleterious effects of alcoholic beverages on the nervous system. These effects appear to some extent to increase *pari passu* with the degree of concentration of the beverage; hence we find that spirits are by far the most pernicious form of alcoholic beverage. General experience however points to the conclusion that the higher alcohols and aldehydes which, according to recent revelations, are contained in many varieties of whisky and brandy, are much more poisonous than ethyl alcohol. It would be interesting to know if those degenerates who take their alcohol in the form of eau-de-Cologne, lavender-water, tooth-washes or spirit from the specimen jars of anatomical museums ultimately suffer from chronic alcoholic insanity; I have never heard of such a case. The disease undoubtedly occurs in other than spirit-drinkers; but the other forms of alcoholic beverage, even when taken in large quantities, appear to be much less potent to produce insanity. Even our three-bottle ancestors, whose excesses are reported to have been very productive of gout, are not, so far as I am aware, said to have been especially liable to chronic insanity.

Although experience teaches us that the daily ingestion of alcohol is conducive to general health and well-being, several German experimenters have found that increased motor excitability and diminution of the mental powers are discoverable for some thirty-six hours after the ingestion of about two litres of

German beer. The conclusion from such findings is that everybody who takes alcohol regularly with his meals is permanently under its influence. It therefore becomes somewhat difficult to decide what quantity of alcohol is to be called excessive. A person's sensations may be quite unreliable, for some people can drink enormous quantities of alcohol for years without ever being, in the popular sense, the worse for drink. Yet the ultimate result is permanent damage to the nervous system. Such a person should ascertain how much alcohol his tissues are capable of oxidizing and make it a rule to keep within that quantity. If he drinks more than this, the excess is excreted and may be detected in the breath three or four hours after its ingestion. It has been demonstrated that alcohol is also excreted in the urine, sweat and bile and that it may be detected in the blood. As long ago as 1839 Percy demonstrated its existence in the ventricles of the brains of animals poisoned with alcohol and showed that the nervous tissues had a peculiar affinity for this drug. Most people are capable of oxidizing about 2 ounces of alcohol in the twenty-four hours: this quantity is contained in about 4 ounces of brandy, whisky, rum, gin or liqueur; 10 ounces of port, sherry or Madeira; a pint of champagne, hock or claret or 2 pints of beer. It need scarcely be urged that, if these maximum quantities be taken, it is not desirable that they be taken at one sitting. Rivers and Webber have recently shown that doses of alcohol up to 20 c.c. (about 6 drachms) have no influence in increasing or diminishing muscular work.

The brain of a normal person possesses the power of resisting the effect of a certain amount of alcohol, which is usually much more than that above mentioned and varies with different individuals. If a larger amount than this be taken the result is physiological inebriation. In some individuals, however, the capacity of resistance to alcohol is very small indeed: with them the ingestion of very small quantities leads to pathological inebriation.

An intolerance of alcohol may be congenital or acquired. It is congenital in persons with a neuropathic inheritance, especially in epileptics and patients who are subject to the intermittent and periodic forms of insanity or suffer from dementia præcox. It is acquired by many persons who have been subjected to the influence of prolonged fevers or sunstroke, have received at

some time a violent blow on the head or have been guilty of frequent alcoholic excesses in previous years.

Similarly the inclination to drink too much may be due to congenital nervous instability as in the case of dipsomania, which may be either an epileptic equivalent or a variety of true impulsive insanity. On the other hand, the inclination may be acquired either from convivial habits or from repeated attempts to drown some sorrow (pseudo-dipsomania).

Not every case of mental disease with a history of previous alcoholic excess is a case of alcoholic insanity. Many attacks of insanity are ushered in with an alcoholic bout, this being a symptom and not a cause of the disorder. Again there are cases of mental disease not to be classed as alcoholic insanity, although they owe their origin to degeneration of the nervous system induced by alcoholic excesses. Of this nature are some cases of epileptic insanity and intermittent insanity (mania and melancholia). Alcohol also plays an important rôle in the causation of some cases of arterio-sclerotic insanity, senile dementia and perhaps general paralysis.

Physiological Inebriation.

This condition is a passing disturbance of the physical and mental functions, induced by a poisonous dose of alcohol. At first there is an increase in the frequency of the pulse and respiration with general dilatation of the arterioles and consequent lowering of blood-pressure. This gives rise to a feeling of warmth and well-being. Muscular power is increased and the onset of muscular fatigue delayed, as shown by the ergograph. The imagination and flow of ideas are stimulated.

On the other hand, the faculty of volition is reduced, including the capacity for mental work, voluntary attention and the capability of passing judgment in the course of an argument. The moral sense and the power of self-criticism are diminished. There is a tendency to the formation of illusions and a certain amount of imperception occurs. In the domain of vision this may be partly due to diplopia.

The emotional tone varies in different individuals. Most people are jovial, some are hilarious, others are depressed and perhaps tearful; some are arrogant and querulous, others again are suspicious or sentimental.

Similarly the disorder of speech varies in different individuals. Some are garrulous and incoherent, others are dumb and yet others eloquent. Articulation is difficult and indistinct.

When the intoxication is more advanced the drunkard loses control of his limbs and staggers in his attempts to walk. The frequency of the pulse and respiration now become diminished. There is well-marked anæsthesia, external impressions fail to reach the sensorium and the patient falls into a deep sleep or coma. Recovery usually takes place after several hours, leaving a sense of malaise with headache and loss of appetite. Death sometimes occurs from paralysis of the respiratory centre.

Treatment consists in washing out the stomach and administering a purge with sal volatile or hot coffee. Occasionally it becomes necessary to resort to artificial respiration.

Pathological Inebriation.

This disorder is usually caused by much smaller quantities of alcohol than are necessary to induce the condition above described; in some cases one or two glasses of beer are sufficient. It arises in patients with congenital or acquired neuropathic taint.

The commonest form, *mania a potu*, is an attack of intense motor excitement. The patient appears to be in a state of semiconsciousness and to have absolutely no control of his actions. In his violent fury he may attempt homicide or suicide, especially by precipitation. Indecent exposure, carnal assaults on women, incendiarism and theft are common, the patient remembering little of such incidents on his recovery. There is usually some tremor of the hands and tongue and difficulty of articulation. The gait is uncertain and slightly reeling; but the patient is capable of steadying himself when he finds that this symptom is attracting attention. The knee-jerks are diminished. Recovery usually takes place in a couple of days without treatment.

Tanzi mentions an apoplectic form which sometimes leads to coma and death. It would therefore be well to wash out the stomach should the patient be seen sufficiently early.

Pathological inebriation occasionally resembles the physiological variety, the only difference consisting in the small quantity of alcohol which has induced the condition. Transient melancholia with suicidal tendency sometimes occurs.

Delirium Tremens.

Delirium tremens is an acute disorder resulting from chronic alcoholism. A single alcoholic bout will not produce delirium tremens unless the patient has been continuously under the influence of alcohol for at least some weeks previously.

An attack may be precipitated by any kind of shock, especially physical injury such as a fracture or a surgical operation, and acute fever, such as influenza, pneumonia and typhoid. In the treatment of these conditions the patient is generally put to bed and deprived of his usual excessive quantity of alcohol. It is then found that delirium tremens develops. This has given rise to a notion that the disorder is due not to alcohol but to the sudden deprivation of alcohol. The idea also receives apparent support from the not infrequent history that the patient has taken no alcohol for several days previous to his illness, but this is to be explained by the fact that one of the earliest symptoms is a dislike for stimulants. We learn, moreover, from the authorities of prisons that suddenly enforced abstinence does not in itself induce an attack, even in the worst drunkards. Further we see many patients who have drunk hard right up to the time when they come under observation. Loss of appetite for food is a feature which has given rise to another probably mistaken notion that failure to take nourishment is an etiological factor, whereas this also is one of the early symptoms of the disease.

It is probable that delirium tremens is not entirely due to the direct action of alcohol, but also to a secondary auto-intoxication; otherwise the condition should pass off within forty-eight hours of the last bout, by which time almost every vestige should be eliminated; whereas clinical experience teaches that the disease lasts from four days to three weeks or more. It is now well established that the introduction of any poison into the system stimulates the tissues to throw out defensive substances of various kinds and it seems likely that, in the case of chronic alcoholism, these would-be defensive substances being produced in excess are partly the cause of delirium tremens.

Another etiological factor is the predisposition of the individual to this particular form of alcoholic insanity, since we find that delirium tremens is liable to occur several times in the same person.

Onset.—The first indications make their appearance in the night. The patient is restless and sleepless. What snatches of sleep he can get are disturbed by horrifying dreams. By day he is restless, suspicious, irritable and timid.

Physical Signs.—The general aspect of the patient is characteristic. His face is flushed, his conjunctivæ suffused and his skin bathed in sweat. During the first few days there may be a rise of temperature: this is not above 100° F. as a rule, but I have seen it as high as 104° F.

The flow of saliva is increased, the tongue is therefore moist and but slightly furred. The appetite is poor and the patient may absolutely refuse food so that he has to be tube-fed; there is even a revulsion from alcohol. Constipation is the rule.

The pulse is frequent, soft and full in the early stages; later it tends to become small and feeble. The respirations are deep and slightly increased in frequency; the breath has a heavy, offensive odour.

The urine is scanty and high-coloured and its specific gravity is raised; it frequently contains albumin and casts. The blood shows a general leucocytosis with diminution of the eosinophiles.

The pupils are at first contracted, but they usually become dilated as the disease progresses. There is general motor weakness associated with tremor. This tremor is an exaggeration of that of the habitual drunkard. It is said to occur first in the feet. It is rather coarse, increases on movement and affects the fingers, lips and tongue most; but in a severe case it may be detected in any part of the body by placing one's hand there. The hands and fingers are in constant movement, a symptom which, according to the argument on p. 214, may be taken to indicate irritation of the cortex by toxins in the blood. The knee-jerks are usually diminished; in some cases they are exaggerated and rectus clonus occurs. The superficial reflexes are diminished or absent.

Mental Symptoms.—Many authors state that there is general hyperæsthesia during the early stages. This may be so; but later in the disease, especially in the more protracted cases which we see in asylums, there is peripheral anæsthesia and contraction of the visual fields.

The most marked disturbances are in the domain of perception. Hallucinations, especially visual, dominate the clinical picture. The patients see enormous spiders, rats, snakes,

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vultures, mannikins with ugly faces, grimacing devils with pitchforks and all manner of strange beasts, terrifying and grotesque in their hideousness. These hallucinatory objects are usually slate-blue in colour, hence the popular name, ' blue devils '. A piece of red glass placed before the patient's eyes does not alter the colour of these images. The hallucinations of hearing are also of a terrifying nature, such as revolver shots, the clatter of engines of torture and voices saying, ' Kill him!' ' Let us skin him!' ' Murderer!' etc. Cutaneous hallucinations are in keeping; the patient feels the sting of the serpent's fang, the dog's bite, the stroke of the knife, stabs and sensations of burning.

Hallucinations are easily induced in such patients. If you point to the floor and say ' What is that?' he will answer ' A snake ', ' A dog ', ' A flower ', according to the nature of the image induced. Pressure on the closed eyelids will evoke moving pictures. If this be done and the patient asked what he sees, he will answer somewhat in this fashion: ' I see a horse. Here comes a man; he is mounting the horse; now he is riding towards me,' etc. Or if you say to the patient, ' Listen! what is that noise?' he will answer ' Soldiers ', ' Music ', ' The dog barking ', the answer varying, of course, with the nature of the hallucination. Hallucinations of other senses may be similarly suggested. This feature is almost peculiar to delirium tremens; but I have observed it in a few other cases in which hallucinations were a prominent symptom.

In spite of the extraordinary grotesqueness of many of the hallucinations the patient invariably accepts them as real. He is unable to recognize their true nature. Yet in the midst of the delirium a sharp word will bring him to his senses and he will converse rationally for a few moments.

Imperception is another prominent symptom. There is partial psychical (not retinal) colour-blindness, so that the patient confuses greens and blues, especially yellowish and greenish blues. Objects cannot be recognized, at least if they are at all out of the ordinary, and if the patient be shown a simple picture he is unable to tell what it portrays. Similarly he is unable to understand simple commands if they be uttered in a monotone without his being shown what to do. If for example you say to him ' Put your left little finger on your nose ', he is utterly confused as to your meaning. Motor and agnostic apraxia are present in all severe cases.

Disorientation is constant. The patient may look round his room, perhaps the padded room of an asylum, and out on the asylum grounds and yet believe himself to be in his own home. He cannot tell the time of day, the date, month or even in some cases the year.

Except for the distracting effect of hallucinations the flow of ideas is coherent and obeys the ordinary rules of association.

The memory for recent events is practically nil ; the events of former years are well remembered.

The general emotional tone dependent to a large extent on the tremor is one of timidity, anxiety and fear. Emotional reaction is good and dominated by the hallucinations. In those cases in which the hallucinations are of a pleasant nature the patients may be more or less cheerful.

At the height of the disease the instinctive motor system dominates action and volition proper is in abeyance. Actions tend to be impulsive, are frequently of a violent character and are mostly initiated by hallucinations. Homicidal and suicidal impulses sometimes occur.

Actions which have become automatic are also in evidence ; hence occupation delirium is almost a constant feature. The butcher busies himself in hanging up carcasses, the carpenter saws imaginary pieces of wood, the small shopkeeper spends his time putting up and taking down the shutters of his shop and so on.

Attention can always be reflexly aroused with a little trouble, *e.g.*, by shaking the patient and speaking sharply to him ; but active voluntary attention does not occur during the height of the disorder.

Except for the occasional incoherence and the erroneous choice of words (paraphasia) speech is normal. Articulation, on the other hand, is usually tremulous and blurred, the greatest difficulty being with the consonants.

Insomnia is absolute, at least in those cases (the majority) which last three or four days. The disease terminates, however, in a profound sleep. In the prolonged cases sleep returns more gradually.

The patient's subsequent recollection of the various details of his illness is very imperfect. This characteristic of the disease probably accounts for the fact that such an experience has no deterring effect on the chronic drunkard. The illness being over

he soon lapses into his old habits. In all too many cases the disorder again and again recurs.

Prognosis.—Nearly all the cases make a complete and rapid recovery. In a certain number, however, it is found, on recovery from the acute condition, that the patient is an alcoholic dement or that there is a substratum of chronic mania or some of the other alcoholic psychoses hereinafter described. The disease terminates fatally in about 5 per cent. of the cases, usually from cardiac failure. This result is to be feared when the sphygmographic tracing shows an 'irregularly undulating' character (Anstie). The prognosis should be guarded when a large amount of albumin is present in the urine and especially when the daily amount of that secretion begins to fall. In a few cases death takes place from convulsions.

Treatment.—Delirium tremens should be treated in a more or less darkened room in which there is a plentiful supply of fresh air. If these conditions can be obtained in a padded room, so much the better. The patient should be persuaded to remain in bed; but it is better to allow a certain amount of restlessness than to exhaust him by constant struggling.

Plenty of nourishment should be administered in small doses at frequent intervals. Bread and milk or milk alone is the best form. It is better to avoid soups, beef-tea and mince, lest such articles of diet should throw too much strain on the kidneys.

Bread-and-butter, vegetables and fruits are permissible if the patient can be induced to take them. Of course, alcohol finds no place in the dietary.

The only medicines which seem to be called for are hypnotics; but these patients are so remarkably tolerant of hypnotics that only the most alarming doses are at all effectual. Anstie used to give as much as 2 drachms of chloral hydrate in the twenty-four hours. It seems to the author that three nights of insomnia are likely to prove much less dangerous to the patient's life than such enormous doses of a cardiac depressant.

If, however, a hypnotic appears to be imperative amylene hydrate in doses of 1½ drachms or sulphonal in 30-grain doses nightly is to be preferred.

Infusion of digitalis in ½-ounce doses every three hours is indicated, should the secretion of urine begin to fail. Some of the older physicians used to regard this drug as a specific for delirium tremens.

In spite of the most careful treatment we occasionally encounter cases in which collapse threatens about the third day, collapse which appears to be due to the sudden deprivation of alcohol. In such circumstances it becomes necessary to allow 4 ounces of brandy daily for a short time. The effect is nothing short of marvellous. Here indeed we have a condition in which the life of many a patient may be saved by means of a ' hair of the dog that bit him '.

Chloral Delirium Tremens.—Delirium tremens is occasionally caused by the abuse of chloral hydrate. At the present day when there is such a multiplicity of hypnotics accessible to the general public, chloral delirium tremens appears to be much less frequent than it was twenty years ago when the number of known hypnotics was more limited.

In its clinical aspect the disease differs in no essential particulars from the alcoholic form. It is said that the tremor caused by chloral is finer than that caused by alcohol and that the odour of the breath at the onset of the disease is that of chloroform. It follows that the physician must usually rely on the previous history of the patient in order to make a correct diagnosis.

The Polyneuritic Psychosis.

Korssakow's Syndrome.

I place the description of the polyneuritic psychosis among the alcoholic insanities because alcohol is the most common cause of the disorder. Korssakow obtained an alcoholic history in three-fifths of his cases. Other causes besides alcohol are phthisis, influenza, septic infection, diabetes and chronic poisoning by arsenic, lead, mercury or carbon bisulphide. Dupré reports that he has known the disease to be caused by intensive mercurialization for syphilis.

The disease occurs more frequently in women than in men and usually in adult life. The earliest case which I have observed was that of a girl aged fourteen who developed the disease from taking large doses of arsenic for chorea and I have seen two similar cases under twenty years of age. Neuropathic heredity is fairly frequent.

The disease, as its name denotes, is a mental disorder associated with peripheral neuritis. While the psychosis is characteristic, the neuritis differs in no way from neuritis unaccompanied

by mental symptoms. The muscles of the limbs are tender while the skin over them is anæsthetic or hyperæsthetic. There is either inco-ordination or paralysis of movement. The tendon reflexes are absent or, less frequently, exaggerated and there may be some nutritional disturbance such as 'glossy skin' or splitting of the nails. In the alcoholic cases nystagmus is common and central scotomata may occur. For a fuller account of neuritis the reader must refer to works on general medicine. The appetite is poor and the patient loses weight, this loss being partly due to muscular atrophy consequent on the neuritis.

Mental Symptoms.—The mental symptoms appear somewhat suddenly, sometimes with an attack of delirium tremens. There are commonly a few hallucinations of vision during the early stages of the disease, but they are not a prominent feature in the clinical picture. Imperception is well marked, especially in the domain of vision ; the patients may not be able to recognize familiar objects and they cannot take in a situation portrayed in a drawing. They mistake identities and are usually disorientated in time and place.

There is usually some predominant emotional tone which varies from patient to patient, such as depression, hilarity, anger, anxiety or surprise. Nevertheless emotional reaction is normal or perhaps exaggerated, the patient weeping or crying on trivial provocation. Instinctive attention is normal, but voluntary attention poor. In spite of a considerable degree of mental confusion, instinct and volition are but little affected.

Disturbances of memory are the most pronounced feature of the disease. The memory of incidents which occurred prior to the illness is fairly good ; but the patient is unable to store up new impressions (anterograde amnesia). There is consequently profound loss of memory for recent events.

It is in this disease that so-called paramnesia occurs most characteristically, illusions of memory and illusions of recognition. The most common illusion of memory is that the patient believes that he has been out for a walk when he has not left his bed or that he has just received a visit from some relation when nothing of the kind has occurred. The most common illusion of recognition is that the patient recognizes his present environment as having been previously experienced. He will

say that he has been in the hospital before when it can be proved that he has not; or perhaps he erroneously recognizes some of the attendants as old acquaintances.

It would appear from the following incident that illusions of memory may sometimes be suggested to these patients. One morning I asked the patient B. whether he had been out for a walk. He told me he had been up the Kennington Road with W., another patient suffering from the polyneuritic psychosis, to pawn his watch. Knowing well that neither patient had been outside the grounds I confronted B. with W. and asked 'Have you been out with B. this morning?' To my astonishment, W. replied 'Yes, doctor: I went with him up the Kennington Road to pawn his watch'. There was no attempt to deceive on the part of these patients; both really believed that the incident had taken place.

Suggestibility in these cases is also shown by the readiness with which they will believe the most improbable tales. As in all alcoholics there is poverty of judgment and of the critical faculty. Nevertheless fixed delusions are rare.

Speech and articulation are usually unaffected.

The patient is sleepless for a week or two at the beginning of the disease, but unless the pains in the limbs are troublesome the insomnia soon passes off.

Clinical Varieties.—The clinical picture varies somewhat with the prominence of this or that symptom. The French school recognizes amnesic, confusional, delusional, anxious and demented forms of the disease. Such a classification appears to be unnecessary. On the other hand it is important to recognize that the psychosis above described sometimes occurs without any clinical signs or symptoms of peripheral neuritis.

Prognosis.—Recovery generally takes place in six to twelve months, but the disease usually leaves a certain amount of mental enfeeblement, sometimes profound enough to necessitate permanent care in an asylum. Death from cardiac failure occurs in a few cases.

Morbid Anatomy.—Patients who have died of this disease show fatty degeneration of the liver, kidneys and heart. There is usually some œdema of the meninges and the cerebral cortex is thinner than natural, otherwise macroscopic examination of the nervous system reveals nothing abnormal.

In those cases in which there is a certain amount of chronic

meningitis, lymphocytes may be detected in the cerebro-spinal fluid. This may be ascertained by means of a lumbar puncture during life.

Microscopical examination of the cortex cerebri reveals atrophy of the tangential fibres and degeneration of nerve-cells, which is best seen in the giant-cells of Betz. The degeneration is rather characteristic; the cell-body is swollen, the nucleus swollen and eccentric in position and there is perinuclear chromatolysis. Subsequently, the nucleus becomes adherent to the cell-wall, shrinks and disappears; *then* chromatolysis takes place in the periphery of the cell-body. Similar changes may be observed in the large motor cells of the anterior horns of the spinal cord. This form of degeneration is that which takes place when the axis-cylinder of a neuron has been damaged (*reaction à distance*).

From these observations it is to be concluded that the brunt of the battle with the toxic agent which induces the disease is borne by the nerve-fibres of both the peripheral and central parts of the nervous system and that the cell changes are secondary to the fibre changes.

In some subjects the peripheral nerves are less resistant than the cortical fibres to the action of a toxin and multiple neuritis occurs; in others the cortical fibres and peripheral nerves are equally vulnerable and we have a typical case of the polyneuritic psychosis; in a third class the cortical fibres are less resistant than the peripheral nerves with the result that the psychosis occurs but is unassociated with multiple neuritis.

Treatment consists of prolonged rest in bed and improvement of the general nutrition by means of a plain liberal diet with plenty of milk. Alcohol and other drugs which are apt to induce neuritis should be withheld.

If there is severe pain in the limbs it may be mitigated by phenacetin or antifebrin; a water-bed is often desirable. The nutrition of the wasted muscles may be maintained by daily use of the constant current. When all pain and tenderness have disappeared massage is useful and the patient may be permitted to get up for the greater part of the day.

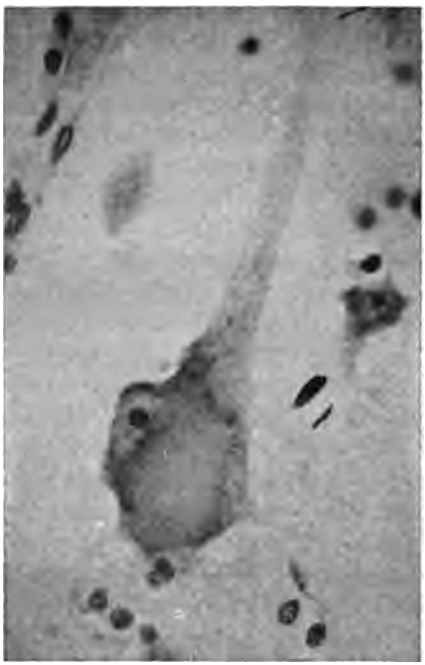

FIG. 66.—A BETZ CELL IN A STATE of AXONAL REACTION (REACTION À DISTANCE) SUCH AS IS PRODUCED BY SEVERANCE OF OR INJURY TO THE AXON.

In this case there is advanced chromatolysis beginning in the central part of the cell and spreading outwards and the nucleus is displaced and shrunken It is often impossible to differentiate early stages of this change from the immature form represented (Fig. 60). [Negative kindly lent by Dr. John Turner of Brentwood Asylum.]

To face p. 316.

Subacute Alcoholic Insanity.

Alcoholic Pseudoparesis.

This is a subacute form of alcoholic insanity induced by chronic alcoholism. The disorder owes its name to the resemblance which, in its earlier stages, it bears to general paralysis.

Epileptic and epileptiform convulsions may occur. Pseudoparesis is not, however, the only form of alcoholic insanity associated with convulsions. Isolated attacks may happen to a chronic alcoholic after a single debauch: they may usher in an attack of delirium tremens or coma during the course of that disease or they may be observed during the early stages of the polyneuritic psychosis. Convulsions are especially mentioned in this connection, because they, among other symptoms, are liable to mislead an unwary practitioner into supposing that he has to deal with a case of general paralysis instead of one of subacute alcoholic insanity.

As in general paralysis there is well-marked tremor of the face, tongue and hands, but the tremor has different characteristics in the two conditions. Alcoholic tremor tends to affect the upper part of the face (orbiculares palpebrarum) rather than the lower as in general paralysis the lingual tremor is a rippling on the surface, not, as a rule, an ataxic trombone movement as in general paralysis; and, while the tremor of the fingers is coarser in alcoholism, the alcoholic is more capable of steadying the tremor than the general paralytic.

The alcoholic is more ataxic than the paralytic in his movements: the former totters when he walks, the latter shuffles. The pupillary light-reflex is retained in pseudoparesis except in a few syphilitic cases, but the pupils may be unequal in size. Contraction of the visual field is liable to be more marked in pseudoparesis than in general paralysis and there may be central scotomata.

The knee-jerk is usually exaggerated, but not 'floppy' as in general paralysis. In some cases associated with neuritis the knee-jerk may be absent. The physician is then called upon to make a differential diagnosis between peripheral neuritis and tabes dorsalis.

In some of the neuritic cases there may be anæsthesia of the hands and feet.

Mental Symptoms.—These develop much more rapidly in pseudoparesis than in general paralysis. The patient is more

confused in the early stages; he is disorientated in place and time and there is general imperception.

Hallucinations of vision occur and are liable to take the shape of animals; hallucinations of the other senses are not common.

There is confusion of ideas; judgment and reasoning are almost in abeyance. Expansive delusions occur as in general paralysis and there may be delusions of persecution.

At first the instincts and emotions are deficient and the patient may be wet and dirty. Later, as he improves, he becomes excessively emotional. He is incapable of sustained attention

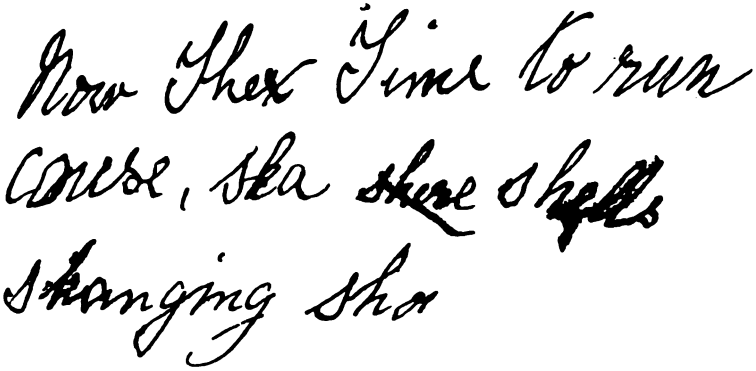

FIG. 67.—WRITING IN SUBACUTE ALCOHOLIC INSANITY.

The patient was asked to write 'Now is the time for all good men to rally round the cause'; then, 'She sells sea-shells and shaving-soap'.

and instinctive attention is reduced to a minimum. There is great disturbance of memory, the amnesia being much more profound than in an early case of general paralysis.

Incoherence of speech is the rule. Articulation is difficult, chiefly on account of the patient's tremulous condition; but there is not the same tendency to elide or repeat syllables and words as there is in general paralysis. Similarly writing is difficult on account of the hand tremor and general confusion.

Insomnia is well marked after the patient has slept off his last alcoholic bout, whereas the general paralytic sleeps fairly well when first he comes under observation.

Course and Prognosis.—The most striking difference of all between pseudoparesis and general paralysis is that recovery

from the former condition is usually complete within two or three months. It is true that there may be a certain amount of residual dementia, but it is not progressive. Death occurs in a few cases from cardiac failure or convulsive seizures.

The morbid anatomy of the condition is that of chronic alcoholism. To a certain extent it resembles that of general paralysis; but there is less involvement of the neuroglial elements, decortication does not occur on stripping the pia arachnoid from the cerebrum and granulation of the ventricles is uncommon.

Treatment is carried out on general lines, viz.: removal of the cause of the disease, maintenance of nutrition, relief of insomnia and prevention of self-injury.

Chronic Hallucinatory Insanity.

This form of alcoholic insanity is characterized by delusions of persecution based upon persistent hallucinations, especially of hearing and cutaneous sensation.

Physical Signs.—In this disease the physical signs referable to the nervous system are practically nil. There may be slight tremor of the fingers and tongue and there is commonly exaggeration of the deep reflexes when the patient first comes under observation: even these signs disappear as the disease becomes established.

There is usually loss of appetite on account of an acid dyspepsia and the bowels are constipated. There may be some enlargement of the liver and albumin may be present in the urine, but such changes are infrequent.

Mental Symptoms.—On examination sensation and perception appear to be normal and the patients can appreciate the nature of their environment. At first they complain of headache and general malaise: these symptoms soon disappear with improvement of the general nutrition.

The hallucinations occur at first during the night, subsequently during the day as well; gradually they come to dominate the whole mental life of the patient. He hears abusive, threatening and mocking voices using disgusting and often obscene language. There seems to be a special tendency for these hallucinatory remarks to have reference to sexual matters; the patient is told that he is impotent, that his wife is unfaithful

and he is accused of unnatural sexual offences. He is threatened with all sorts of tortures. The voices are commonly referred to the ceiling, floor or walls; hence he believes that there are men on the roof, telephones in the walls and electric wires under the floor. Strange cutaneous sensations are similarly ascribed to some form of unseen agency. The patients are mesmerized, electrified by wireless telegraphy or X-rayed. Neologisms are commonly employed in this condition to explain the unusual sensations. One patient is 'petered in a hodge-podge', another is persecuted by 'the teleform switchback confederation of blacklegs'.

Hallucinations of smell occur and give rise to the delusion that poisonous gases are instilled into the dormitory; hallucinations of taste similarly induce ideas of poison.

Apart from the hallucinations the patient is capable of maintaining a coherent train of thought and judgment is fairly good. He has, however, no insight into his mental condition; he accepts his hallucinations and is full of delusions of persecution. A few patients develop expansive delusions, a sure sign of intellectual ruin.

The prevailing emotional tone is one of anxiety and quarrelsomeness. The patients are difficult to get on with and are apt to limit their remarks to the doctor to monosyllables. Emotional reaction is good.

Instinctive and volitional action are normal but dominated to a large extent by hallucinations. One patient wears a wet handkerchief on her head to ward off the electricity, another sets 'booby-traps' at night to catch her persecutors, another fills the keyholes with paper to keep out noxious gases; others again perform grotesque actions to counteract the evil influences; one patient, for example, would vigorously turn an imaginary handle in his heel whenever he had cutaneous pricking sensations, as if to wind himself up.

The patients are clean and tidy; they look after themselves and are capable of useful occupation. Speech is coherent, articulation clear and writing unaltered. Sleep is fairly good, but liable to be disturbed by hallucinations.

Prognosis.—The disease almost invariably runs a chronic course. During the first two or three years the hallucinations tend to become less frequent and the patient passes into a condition of mild dementia. A few cases recover sufficiently to be able to return home.

As far as I am aware, the **morbid anatomy** of this condition has not been investigated.

Treatment consists of the total withdrawal of alcohol, improvement of the general nutrition and, in the majority of cases, permanent care in an asylum.

ALCOHOLIC PARANOIA.

This is a rare disease. It is a form of chronic delusional insanity in which hallucinations are absent or infrequent and play an unimportant rôle. It usually begins about middle-age and occurs more frequently in men than in women.

Physical Signs.—When the patient first comes under observation there are the usual signs of chronic alcoholism such as tremor of the hands and tongue, digestive troubles and exaggeration of the deep reflexes. These signs soon pass off with the withdrawal of alcohol. After a month or so there is complete absence of physical signs.

Mental Symptoms.—Sensation and perception are usually normal. During the early stages there may be a few hallucinations. Ideation is normal; the patients are capable of initiating and maintaining an ordinary train of thought and their memory is fairly good for both recent and remote events.

Disturbance of judgment is the essential feature of the disease, the patient seeing hidden meanings in the most commonplace incidents. As a rule, the erroneous judgments have reference to his wife's fidelity (Eifersuchtswahn). He sees evidence of her infidelity in the fact that she bows to an old acquaintance in the street, that some man unknown to him hurries past the window, that his wife is not prepared for his return from the office an hour earlier than usual or that the cushions on the sofa are not in their usual position.

If the disease is ushered in by an attack of delirium tremens, he may ascribe the illness not to his admitted alcoholic excesses, but to drugs introduced into his whisky by his wife.

I have met with one case of religious paranoia due to alcohol. The patient was 'converted' by a Salvation Army girl, took to preaching and ultimately, by the help of hidden meanings in certain passages of Scripture, believed himself to be the re-incarnation of the prophet Jeremiah. He regards the coronation stone in Westminster Abbey as God and as the stone

on which Jacob rested his head. He believes England to be the land of Canaan, the Ark of the Covenant to be buried under a mound in Camberwell House, the grave of Eve to be situated in the grounds of Bethlem Hospital, and other absurdities. At the onset of the disease he had a few hallucinations, heard the voice of God and had visions of heaven.

The patients are capable of sustained attention. Emotional and instinctive reaction are normal.

A jealous patient is liable to commit violent assaults on his wife and her supposed lovers ; otherwise his actions are normal. Speech and writing are normal and the patients are capable of useful employment in an asylum.

Diagnosis.—The disease is distinguished from true paranoia by its rapidity of onset and absence of system in the delusional state.

Prognosis.—The disease is incurable but not progressive. A certain amount of improvement sometimes takes place in an institution, but relapse invariably occurs if the patient returns to his own home.

The **morbid anatomy** of the condition has not been recorded.

Treatment consists of total abstinence from alcohol and permanent care in an asylum.

Alcoholic Dementia.

The natural termination of alcoholism is dementia. This may develop insidiously without the patient having an attack of acute insanity or it may be a sequel to some of the disorders above described.

Symptoms.—Loss of sensation, when present, occurs on the backs of the fingers ; it is seldom more extensive. Hallucinations and illusions are uncommon. Perception is good unless the prolonged abuse of alcohol has resulted in severe degeneration of the cerebral arteries.

The patients are irritable and difficult to get on with ; they are consequently very annoying to others. This applies equally to cases of chronic mania resulting from alcoholism.

Loss of memory is a constant symptom and may be so profound that the patient cannot remember what he has been told a few seconds previously. I have known a patient, who had been in the same ward for twelve months, ask an attendant

for the lavatory as if he had only just entered the hospital. On being directed a distance of some twenty yards he would set out, forget the direction, return to another attendant and rail at him for not having directed him properly.

There is poverty of ideation, falsification of judgment and warping of the reasoning faculties. Sometimes the patients express delusions of grandeur or write cheques for enormous sums of money.

In the earlier stages the animal instincts are allowed full play owing to loss of voluntary control; in more advanced cases instinct is lost after the manner described on p. 137.

In some cases the disease may be arrested by the withdrawal of alcohol; but there is no hope of improvement in the patient's condition. In other cases the disease is progressive, leading to total obliteration of the mental faculties as well as motor weakness so that the patient is unable to stand. Further he may be wet and dirty, liable to develop bedsores and require as much attention as a general paralytic; but the absence of physical signs of that disease and the general history of the case will prevent erroneous diagnosis.

Morbid Anatomy.—In one case of this kind which I was able to examine post-mortem, there was œdema and thickening of the meninges which stripped with abnormal readiness from the cortex. The cortex was thinner than natural and there was atrophy of the tangential fibres. Neuronal degeneration extended to all parts of the cortex, the most striking feature being an almost complete absence of chromatoplasm from the cell-bodies. In the few cells in which chromatoplasm still remained it consisted of an extremely fine dust.

CHAPTER IX.

SOME OTHER INTOXICATION PSYCHOSES.

MORPHINISM.

Etiology.—The abuse of opium and its alkaloid morphia is less frequent than alcoholism, because those drugs are more expensive and less easy of access to the general public than alcohol. Accordingly we find morphinism most frequently among medical students and practitioners, dentists and nurses who have experience of the drug and little difficulty in obtaining it, and among the wealthier classes to whom expense is no obstacle.

Begun in the first instance for the relief of insomnia or some frequently recurring pain, the morphia habit may become confirmed in less than six weeks, so that the patient is not only unable to discontinue the use of the drug but is obliged to resort to it in ever-increasing doses. In a few neuropathic individuals the habit is started by a single dose taken either to see what the sensation of morphia intoxication is like or to stimulate cerebral activity for the purpose of getting through an increased amount of mental work. More than three-fourths of the patients are men and the habit is usually contracted in the third or fourth decade of life.

In its **physiological action** morphia diminishes all secretions except the sweat and it is a motor sedative. The drug has therefore a pronounced action upon the functions of the alimentary canal; it causes dryness of the mouth, disturbs the digestion, diminishes the appetite for food and induces constipation. The pulse-frequency is diminished and the blood-pressure lowered by dilatation of the peripheral arterioles. The dilatation of cutaneous vessels causes a feeling of warmth. The respiration becomes shallow and the bronchial secretion is diminished. The pupils are strongly contracted.

In its specific action upon the nervous system morphia is a local anæsthetic and anodyne. By its action on the cerebral cortex it produces a peaceful feeling of happiness and comfort and it stimulates the imagination, in this way increasing the capacity for mental work. In the later stages of its action, if taken in sufficient quantities, it promotes sleep.

When taken habitually, the organism acquires an increasing tolerance for the drug so that the administration of larger and larger doses becomes necessary to procure the above results. It may be presumed that this tolerance results from the formation by the tissues of protective substances antagonistic to the action of morphia. If Marme's statement be correct that the antagonistic substance is oxy-di-morphine, we may conclude that the antagonistic action of the organism consists in an attempt to oxidize the morphia introduced into the system.

Abstinence Symptoms.—Whatever the above natural antidote to morphia may be, it must be held responsible for the symptoms which arise when a morphinomaniac is suddenly deprived of his usual dose. The symptoms are those of poisoning by a perfect antidote to morphia.

There is an increase of all the secretions of the body except the sweat and there is general hyperæsthesia of the skin and mucous membranes. Consequently vomiting and diarrhœa with tenesmus are prominent symptoms and many patients can retain only liquid food. There is also a slight 'cold in the head' with troublesome sneezing, salivation and slight cough. Incontrollable yawning and hiccough also occur.

The pulse-frequency is increased and the blood-pressure raised by contraction of the peripheral arterioles. On account of the contraction of the cutaneous vessels, the patient feels cold and asks for extra blankets on his bed at night. Some patients complain of feeling cold internally. Palpitation and syncope are liable to occur, the latter being one of the gravest symptoms which the physician has to combat in the treatment of these patients.

There is hyperæsthesia of all the senses; the patients complain that the light is too strong and that there is too much noise going on around them. Some suffer from neuralgic pains and other unpleasant sensations in various parts of the body; lights appear before the eyes and there is singing in the ears.

Muscular debility and a sense of fatigue set in, so severe in

some cases that the patient is scarcely able to stand. If he be asked to extend his fingers, they are seen to be tremulous. Muscular twitchings and cramps occur in the limbs ; even general convulsions are reported by some observers. General motor restlessness is a constant symptom which, in some patients, attains the severity of true maniacal excitement for a short period, perhaps with suicidal or homicidal impulses. The superficial and tendon reflexes are greatly exaggerated.

The emotional attitude of the patient is one of abject misery ; and it is this mental depression associated with absolute insomnia, more than any other symptom, which induces patients to abandon the attempt to get rid of the morphia habit, knowing as they do that a single injection of the alkaloid will alleviate all their troubles.

Morphia habitués are unreliable, incapable of persistent application to work, untruthful, depraved, immoral and liable to excesses of debauchery. After many years, insanity (usually melancholia) may be the result of chronic intoxication by morphia.

Often and again does the morphinomaniac determine to mend his ways and give up his habit, but the alkaloid and the syringe are at hand and the temptation invariably proves too strong. He may make a determined effort, pour his stock of morphia down the sink and break his syringe ; but he finds he has to contend with more than the force of habit. Abstinence symptoms arise and become intolerable. A new syringe and stock of morphia have to be purchased and the patient learns that he is a slave to the drug, body and soul.

Diagnosis.—The diagnosis of morphinism rarely presents any difficulty. The patient usually comes under observation with a definite history of the habit and with the request to be cured. Further the alkaloid may be detected in the urine and there are commonly to be found many scars of old abscesses caused by the use of a dirty hypodermic syringe. Should any doubt arise, the diagnosis is easily cleared up by placing the patient in circumstances in which he can have no possible access to the drug. Abstinence symptoms are sure to appear within twenty-four hours if the patient is addicted to morphia.

Prognosis.—It is said that the morphia habit does not tend to shorten life. On the other hand, the possibility of a complete cure without subsequent relapse is small (10 per cent. of the cases, according to Kraepelin). The outlook is better for those patients

who have been accustomed to take their morphia in the form of opium than for those who take the pure alkaloid, better for those who take it by the mouth than for those who take it hypodermically and better for those who take morphia alone than for those who take other drugs with it.

Treatment.—It is advisable at the outset to warn the patient that he must be prepared to endure a considerable amount of suffering while he is being cured, at the same time assuring him that every effort will be made to mitigate his symptoms. He should also be told how long the acute stage of his illness will last, about five days if morphia is completely withheld from the first. By thus dispelling all doubt, one important source of restlessness is removed.

The patient is then put to bed and carefully examined in order to ascertain, *inter alia*, that he has no morphia secreted about him. The room should be quiet, warm and well ventilated; the bed should not face the window, which ought to be supplied with a blind.

The diet is nourishing and consists mainly of liquids (milk and broths) so as to avoid gastro-intestinal irritation and promote urinary excretion.

The weaning of the patient may be accomplished slowly, rapidly or abruptly. With the slow method the dose is daily reduced by about one-tenth. Thus, a patient whose habitual dose had been 30 grains daily would during treatment receive on successive days 27, 24, 22, 20, 18, 16, 14, 12, 11, 10, 9, 8, 7, 6, 5, 4½, 3, 2½, 2, 1½, 1, ¾, ½, ¼ grains, the drug being then discontinued. In the rapid method the dose is at first reduced by nearly one-half daily. Erlenmeyer gives the following table:

RAPID METHOD OF WEANING.

Habitual Dose.	10-30. Cg.	30-40. Cg.	40-50. Cg.	0·50-1. Gr.	1-2. Gr.
First day	8	15	25	30 cg.	50 cg.
Second ,, ...	6	12	15	20	30
Third ,, ...	5	10	12	15	20
Fourth ,, ...	3	6	7	12	15
Fifth ,, ...	2	4	4	8	10
Sixth ,, ...	1	3	3	6	6
Seventh ,, ...	—	2	2	4	3
Eighth ,, ...	—	1	1	2	2
Ninth ,, ...	—	—	—	1	1

In the abrupt method no morphia is allowed from the moment when treatment is commenced, unless syncope or some other form of collapse threatens, when one or two injections of ½ grain each are administered in order to tide the patient over the danger. To the author this method appears to be the least objectionable; because, although the illness is more severe, it is less trying to the patience of the sufferer. Whichever method is used a hot bath greatly conduces to the comfort of the patient and should be given night and morning.

Further to alleviate the patient's suffering during this trying time certain drugs have been recommended as temporary substitutes for morphia, viz., alcohol, chloral and especially cocaine. Cocaine has been greatly praised by Berkley and Obersteiner. If used, the dose should never exceed 10 grains daily, it should be given by the mouth and the patient should on no account be allowed to learn the nature of his medicine. The morphinomaniac is usually well acquainted with the literature of his disease and, all too often, he attempts to cure himself by taking to cocaine. The remedy is worse than the disease, for the invariable result is that the patient becomes a slave to two drugs instead of one.

Insomnia should be combated by a different hypnotic every night, the changes being rung on paraldehyde, amylene hydrate, sulphonal, trional and chloral hydrate. Bicarbonate of soda is an invaluable remedy for the relief of gastric hypersecretion and hyperacidity and should be given as a routine medicine. Erythrol tetranitrate may be given in ½-grain doses to lower the pulse tension if necessary, and digitalis is useful to restore a failing heart. When the circulation is in danger, however, and collapse threatens the author is in the habit of resorting to morphia. Here, as in the case of alcohol, the safest and most certain remedy for the patient is 'a hair of the dog that bit him'.

During treatment the patients lose much weight which is more than regained during convalescence as they gradually return to normal diet. Convalescence should be prolonged to three or four months at least in order to allow time for restoring the nervous system and to establish the habit of doing without the drug.

COCAINISM.

Etiology.—The cocaine habit arises in much the same way as the morphia habit, but it has an additional etiological factor in that morphinism predisposes to it. Morphinomaniacs take to cocaine either as an adjuvant or as a substitute for morphia or as a local anæsthetic preparatory to an injection of morphia. I have been struck by the large number of cases of cocainism started by an attempt to relieve the discomfort associated with diseases of the nose.

The physiological effects of cocaine are largely induced by its stimulating action on the sympathetic system. It raises the blood-pressure by contracting the peripheral arterioles and increasing the frequency of the pulse. In the same way it dilates the pupils, causes retraction of the eyelids and induces proptosis. Glandular activity is increased throughout the organism. Locally applied it causes anæsthesia of the part by cutting off the blood-supply from the peripheral nerve-ends.

In its action on the cerebral cortex cocaine reduces fatigue and causes motor restlessness and excitement. It drives away care and induces a pleasing feeling of peace and well-being. It appears to have a special action on the writing centre, for cocaine habitués write interminable letters which may be abnormally brilliant just after an injection. Association of ideas is facilitated and memory and judgment are improved. The drug destroys the appetite for food. One patient, addicted to cocaine alone, told me that it destroyed the desire for sweet articles of diet, whereas he had a craving for sweets when he was deprived of the drug. Large doses cause muscular spasms, especially of the face.

Cocainism is almost invariably associated with morphinism; addiction to cocaine alone is rare. It is remarkable that, although sudden abstinence from the cocaine habit causes much less distressing symptoms than abstinence from the morphia habit, the former is much more difficult to renounce and the proportion of relapses after apparent recovery is greater.

The **abstinence symptoms** are dryness of the mouth, apepsia and constipation, muscular weakness with tremor, especially of the tongue, diminution of the pulse-rate with fall of blood-pressure and a tendency to syncope.

Some patients complain of pains in the limbs, mostly in the neighbourhood of joints; but most characteristic is formication

of the hands, a sensation of small worms or ants crawling under the skin. Black specks, which may also be mistaken for small insects, float before the eyes and there may be hallucination of hearing.

The association of ideas is uncontrolled, volition is weak and the memory for recent events, even for weeks back, defective. In conjunction with a general feeling of depression the judgment is warped, so that the patients get the idea that the hand of every man is against them ; they become anxious and fear all manner of impending harm. Especially are wives distrusted and accused of infidelity (cocaine paranoia). The patients are often impulsive and violent ; they may wilfully destroy valuable property by reason of some fantastic delusion ; they may murderously attack their supposed persecutors or commit suicide in order to escape them.

The abstinence symptoms appear to be, as with morphia, due to intoxication by a perfect antidote to cocaine, formed—it is reasonable to suppose—by the tissues in their attempts to counteract the evil effects of the drug.

The usual clinical picture of the cocaine habitué presents the above symptoms of cocaine-poisoning and cocaine abstinence in a confused mass, sometimes one symptom, sometimes another becoming the more prominent according to the recency and magnitude of the last dose.

Diagnosis.—The history of cocainism is seldom wanting. In its absence the diagnosis may be difficult, but the same principles are to be applied as in the diagnosis of morphinism. Formication of the hands is more than suggestive. Cocaine paranoia is to be distinguished from alcoholic paranoia by the greater rapidity of its onset and course.

Prognosis.—Recovery from cocainism usually takes place after a few months of enforced abstinence, the acute symptoms passing off within the first few weeks. The drug is, however, so enslaving that relapse occurs even more frequently than with morphia. Cocaine paranoia is liable to last several months and a few patients become permanently insane.

Treatment.—The same principles of weaning the patient apply as in the case of morphia ; but there is less danger of collapse during treatment. The same hypnotics may be used and nux vomica with hydrochloric acid may be given as a routine medicine.

CHLORALISM.

In these days of insomnia it is not surprising to find that the drugs which the plain man finds most alluring are the hypnotics. Morphia has the greatest number of adherents. A few take to chloral (usually women), paraldehyde, sulphonal and others.

When a person habitually uses chloral his organism gradually becomes inured to the usual dose which then proves insufficient to produce the normal physiological effect, presumably on account of an increased formation of antibodies of some kind or other by the tissues.

If at this stage the patient is prepared to put up with several sleepless nights he may be able to throw off the chloral habit: but this is too much to expect from human nature. Increasingly larger doses are taken at first nightly, then during the day as well until a definite attack of insanity supervenes. This is apparently due, not directly to chloral, but to the above-mentioned antibodies; for the phenomena are precisely the same as those which arise when the habitual ingestion of chloral is abruptly suppressed.

Symptoms.—Mental disorder arising from the chloral habit occurs in one of three forms:

1. Motor excitement and agitation with hallucinations of vision and hearing, especially in the evening, and sometimes with epileptiform attacks.

2. Depression with heaviness, torpor and muscular weakness, which may also be complicated by hallucinations; and

3. Delirium tremens which, in the absence of a history, can only be differentiated from alcoholic delirium tremens by the odour of chloroform in the breath.

Insomnia occurs in all three forms. Some patients complain of irritation of the skin, pains in the joints and dyspepsia.

Prognosis.—Recovery occurs after prolonged abstinence. The literature of the subject is too meagre to allow of our determining whether there is much tendency to relapse.

Treatment.—It is said that the patients are liable to syncope and that the abrupt method of weaning is therefore inadmissible. If the patient appears to be in fairly good general health, the rapid method mentioned in the account of the treatment of morphinism may be employed; if not, the physician should resort to the slow method.

Paraldehydism.

During the past ten years I have met with three instances of intemperate addiction to paraldehyde, two of which came under my observation as certified cases of mental disease.

The patients suffer from great motor excitement with occasional violence, tremor of the lips with disturbance of articulation and fibrillary tremor of the muscles of the chest. There is marked imperception with loss of memory and the patient may be unable to recognize his former acquaintances; hallucinations of vision and hearing occur.

Physically the most striking symptom is a profuse bronchorrhœa which may persist for a week or more after the last dose of paraldehyde.

When the excitement subsides the patient falls into a condition of extreme lassitude which gradually passes off as convalescence is established.

Prognosis.—Two of my patients made a complete recovery, the third remained in a state of mild dementia. So far as I am aware, none of the cases have relapsed.

Treatment consists of complete suppression of the drug, the mitigation of symptoms on general medical principles, and overfeeding.

Chronic Sulphonal Poisoning.

This condition is rarely met with. Hæmatoporphyrinuria is the most common symptom; but occasionally the friends seek the advice of the medical man because the patient is always asleep and is supposed to be suffering from 'sleeping sickness'. The latter disease is excluded and the physician put on his guard by the absence of trypanosomes from the blood. The diagnosis is cleared up by placing the patient in circumstances in which he can have no possible access to drugs: the sleepy condition then passes off. Some of the patients have a shuffling or staggering gait.

During treatment the patient should be kept in bed. No untoward symptoms arise from abrupt suppression of sulphonal. Convalescence is established after a few sleepless nights which do no harm.

Cannabis Indica Poisoning.

Indian hemp is largely taken in the form of hasheesh by the natives of India, Persia, Asia Minor and Egypt for the purpose of inducing pleasurable motor excitement and hallucinations which are commonly sexual in character among Eastern races. Hallucinations of vision are also common.

The drug also causes epigastric sensations with anæsthesia of the arms and legs. The time-sense is impaired in such a way that time appears to pass slowly.

The pulse is frequent and of low tension; the face is pale and the pupils are dilated, but they react to light.

Acute intoxication by hasheesh is characterized by drowsiness with a pleasant feeling of exaltation and happiness. The sense of fatigue is abolished. The gait is sometimes staggering, as in alcoholic intoxication.

Acute delirium sometimes occurs as the result of chronic hasheesh poisoning. This is characterized by hallucinations of all the senses, accompanied by delusions of persecution or of exaltation. The patients are restless and sleepless, but not to the same extent as those suffering from alcoholic delirium.

Dr. Warnock, in the *Journal of Medical Science* for January, 1903, states that acute mania from hasheesh varies 'from a mild short attack of excitement to a prolonged attack of furious mania, ending in exhaustion or even death'. The patients suffer from delusions of persecution or of grandeur. Gustatory and auditory hallucinations are not uncommon. 'A certain impudent, dare-devil demeanour is a characteristic symptom'.

Chronic delusions of persecution and chronic mania sometimes occur. If hallucinations are experienced, they play an unimportant rôle.

Lastly chronic dementia comes on with amnesia, apathy, degraded habits and loss of energy.

Under the name 'cannabinomania' Warnock describes the mental condition of hasheesh users between their attacks of acute insanity. 'They are good-for-nothing, lazy fellows, who live by begging and stealing, and pester their relations for money to buy hasheesh, often assaulting them when they refuse their demands. The moral degradation of these cases is their most salient symptom; loss of social position, shamelessness, addiction to lying and theft, and a loose, irregular life, make them a curse to their families.'

Belladonna and Atropine Poisoning.

Belladonna and its alkaloid atropine are liable to give rise to mental symptoms if taken in poisonous doses. In a few patients with idiosyncrasy for the drug these symptoms may be induced by so small a dose as that used in atropizing the eye as a preliminary to estimating a refraction.

Apart from criminal cases, poisoning usually occurs either from eating belladonna-berries or from taking a medicine in which the liniment has been accidentally used instead of the tincture.

The **physical signs** are dryness of the throat, a scarlatiniform rash and dilatation of the pupils with paralysis of accommodation. The pulse is greatly accelerated.

The characteristic **mental symptom** is visual hallucination. This has a special tendency to take the form of threads, hairs, wires and similar objects. There is busy delirium, the patient occupying himself by apparently picking threads out of the tips of his fingers, sewing with needle and thread or plucking fruit from a tree and eating it. In severe cases complete unconsciousness occurs.

The symptoms usually subside in the course of three or four days, but the memory may be defective for a week or more.

Treatment consists of washing out the stomach and administering a solution of tannic acid, perhaps in the form of stewed tea, in order to precipitate the alkaloid. A hypodermic injection of morphia mitigates most of the symptoms. Pilocarpine is also recommended.

Ether Inebriety.

In some villages in North Ireland and in East Prussia certain beverages adulterated with ether find favour among the poorer classes on account of the hilarious intoxication which they rapidly induce at a small cost. Half a pint of ether per diem is not uncommon. There appears to be sudden exhilaration with motor excitement which rapidly passes off, leaving the patient dull and stuporose. He sleeps off the drug and is

apparently none the worse next day for his drinking-bout. Usually he is an old alcoholic, so that it is difficult to ascertain the specific effects of chronic ether intoxication; there seems to be a tendency to melancholia.

Plumbism.

The mental phenomena induced by chronic lead-poisoning are those of uræmia and are directly dependent on chronic renal disease simultaneously induced by the poison.

CHAPTER X.

SENILE (ABIOTROPHIC) AND ARTERIOPATHIC DEMENTIA.

In this group are comprised a number of cases presenting similar clinical features and characterized anatomically by cortical atrophy. In one class this cortical atrophy is due to wasting of the parenchymatous elements as the result of senility, premature or otherwise: these have lived their day and they disappear by a process of abiotrophy. In another class the disappearance of the cortical elements is due to malnutrition of the cortex from degeneration of the cerebral arteries, these having become sclerosed as a result of alcoholism or plumbism, as a sequel to some specific fever or in association with cirrhosis of the kidney (arteriosclerotic insanity). This form of dementia is usually encountered among persons who have attained at least their fifty-fifth year; but it is occasionally met with in the fourth decade as a consequence of past syphilis having caused cerebral endarteritis or atheroma (syphilitic dementia).

Physical Signs. — Apart from hemiplegia due to cerebral thrombosis and softening which is liable to arise in some of the above conditions, the physical signs associated with arteriopathic dementia are those of the disease which has given rise to the arteriopathy. In old age, for example, there is loss of flesh, especially in the limbs and face, the face becoming wrinkled and the eyes sunken. There is fatty degeneration of the upper and lower margin of the cornea (arcus senilis), dimness of vision due to slight opacity of the ocular media, weakness of accommodation, myosis and diminution of the pupillary reaction to light. Fibrosis of the tympanic membrane is responsible for some difficulty of hearing in general and perhaps for the failure, which I have noted in many cases, to hear the high-pitched

notes of a Galton's whistle. There is general muscular weakness, often accompanied by tremor on movement. The old man is unable to stand upright and this, as well as a certain amount of flattening of the intervertebral discs, leads to diminution of stature. The superficial and deep reflexes are usually diminished. Urine is passed with excessive frequency, the urinary passage being obstructed by an enlarged prostate and the bladder thereby distended. Prostatic enlargement occurs in about 34 per cent. of men over sixty years of age. In all cases of general arteriosclerosis, both young and old, the urine is abnormally abundant and dilute.

In the syphilitic cases there is usually some physical sign of the patient having previously contracted that disease, such as psoriasis palmaris, pigmentation of the skin of the leg in the site of a former ulcer, scarring of the fauces from previous ulceration, enlargement of the glands behind the sterno-mastoid, or ocular palsy of some kind. Some of the patients suffer from tabes and are liable to be mistaken for general paralytics.

Mental Symptoms.—Although, owing to the multitude of causes of arterial degeneration, the physical signs met with in these patients may be diverse, there is great uniformity in the mental symptoms.

The earliest stages are characterized by headache, attacks of giddiness, somnolence during the day and insomnia at night. The patient is slow in thought and movement, and emotional reaction is excessive, so that he becomes irritable or perhaps unduly sentimental. Apart from the dimness of vision and difficulty of hearing due to local causes above mentioned, there appears to be no diminution of sensation in any department, even in most advanced cases.

As the disease progresses imperception occurs and is demonstrated by the patient's failure to distinguish between blues and greens and by his inability to take in the meaning of simple sentences or of pictures.

Later he becomes unable to recognize objects or at least to give them a name. He is disorientated in time and place, does not know where he is, has no idea of his age and is unable to say what year it is. In typical cases hallucinations do not occur.

There is poverty of ideation and lack of coherence in the train of thought, any chance percept being sufficient to divert the

patient's purely instinctive attention; voluntary attention is practically obliterated.

Failure of memory is noticeable from the first. Difficulty of remembering proper names marks the beginning of the amnesia which is slowly progressive, the memory subsequently undergoing dissolution according to the laws laid down on page 122 The cortical perception centres are incapable of retaining new impressions and the patient lives in the past. He forgets where he places things and perhaps accuses others of having stolen them.

Motor and agnostic apraxia occur in this disease more constantly than in any other form of mental disorder. In the early stages the patient makes mistakes in his ordinary work, later he loses the faculty of using objects correctly. Ideational inertia is common; for example, if the patient be shown a fountain-pen, he will take off the cap (action correct); if next he be shown an ordinary pencil, he may try to do the same thing with it (action incorrect owing to inertia of ideation). This phenomenon is sometimes to be observed in letters written by these patients, the same phrase or sentence recurring from beginning to end (*vide* letter on pages 140 and 141).

Flexibilitas cerea may sometimes be noted. This is not, however, to be regarded as a true cataleptic phenomenon; it is more probably an example of ideational inertia.

With imperception agnostic apraxia occurs as a matter of course; the patient is unable to use an object correctly because he does not recognize its true nature.

The conduct is characterized by restlessness without energy. There is progressive loss of control of the emotions and instincts. The arteriopathic dement laughs, weeps or shows irritability on very slight provocation.

In a previous chapter of this manual it has been remarked that loss of control of the instincts occurs in the reverse order to that in which control of them is attained in early life, roughly in the reverse order of their evolution. In senile dementia, however, control of the sexual instinct is lost disproportionately early, probably on account of some local irritation caused by prostatic enlargement. This is of considerable medico-legal importance on account of the frequency with which old men, hitherto unsuspected of mental disorder and bearing a spotless reputation, are suddenly arraigned before a criminal

court for a sexual offence, often of an unnatural character. There is a stage in the decay of the old man during which the instinct of possession shows itself in an exaggerated form. He perhaps marries a girl of twenty to gratify his sense of power; and, as regards his worldly possessions, he becomes abnormally canny and suspicious lest others should attempt to deprive him of them, but lacks the enterprise necessary to increase them. Similar loss of control, paralysis of volition, occurs in the arteriopathic cases. Dissolution steadily progresses; the patient may take to collecting rubbish and, in his second childhood, return to the age of make-believe and play. Finally, the instincts themselves disappear, the patient becoming wet, dirty and bedridden like a general paralytic.

The judgment is defective, but there is no great tendency to the formation of delusions. Any delusions which arise are directly dependent on the loss of memory.

Throughout the whole course of the disorder insomnia at night is the rule and is accompanied by motor restlessness. In the daytime, however, these patients are peculiarly liable to drop off to sleep in the midst of a conversation or even when actually speaking.

There is no disturbance of articulation, but the content of thought is so disjointed that speech is usually incoherent and senseless.

Diagnosis.—The disease which most closely resembles arteriopathic dementia is general paralysis; not that the latter is so liable to be mistaken for the former as the former for the latter. Difficulty of diagnosis is most likely to arise among syphilitic cases, especially among those presenting symptoms of tabes.

Mistakes are to be avoided by attention to detail. Tertiary manifestations are rare in general paralysis, but common in syphilitic dementia; in general paralysis, attacks of paralysis are transitory, in arteriopathic dementia they are permanent; in arteriopathic dementia, the dysarthria characteristic of general paralysis is wanting. The writing shows evidence of hand tremor in both classes of patients; but the arteriopathic dement does not omit and repeat words and letters as the general paralytic does. Further, senile tremor does not affect the tongue. The knee-jerk is increased in general paralysis in a characteristic manner, except in the tabetic cases; whereas it is

diminished in arteriopathic dementia. Lastly the disturbances of perception, orientation, memory, and action are much more profound, relatively to the physical condition of the patient, in arteriopathic dementia than in general paralysis. Delusions on the other hand are more common in general paralysis.

The exhaustion psychosis, which may closely simulate arteriopathic dementia, is to be differentiated by the presence of hallucinations and peripheral anæsthesia.

In some patients who are subject to attacks of melancholia, senile dementia is liable during its early stages to simulate that disease. In such cases special attention should be directed to the state of the memory.

No sharp line can be drawn between ordinary senile dotage and senile dementia. The normal mental deterioration incident

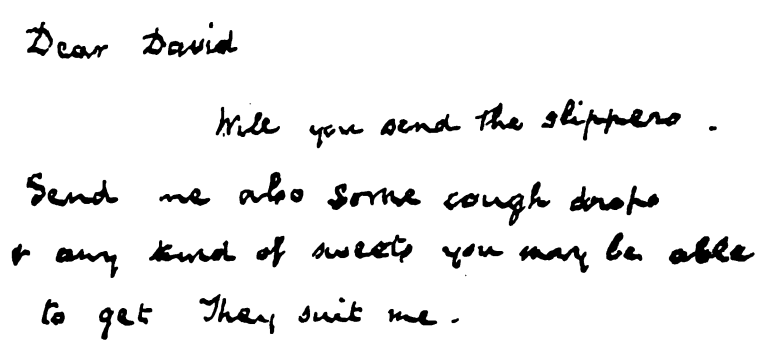

FIG. 68.—SENILE WRITING (*cf.* p. 270).

upon old age is itself early senile dementia. The medical man is likely to be asked in a court of law at what stage of senile decay a man is to be regarded as insane; but the question cannot be answered and it is best to allow each case to be considered on its own merits.

Prognosis.—This form of dementia is indicative of an extensive and progressive organic degeneration of the nervous system; there is consequently little hope of amelioration of the patient's condition by treatment.

In the syphilitic cases the disease may be arrested, but not cured, by the administration of mercury and potassium iodide; in the others death may be expected in five to ten years. In some of the senile cases dissolution takes place within a few months.

Pathology.—The most striking feature at an autopsy on one of these patients is the great wasting of the brain.

The cortex is thinner than natural and the convolutions are atrophied. The whole of the brain is wasted and not uncommonly weighs less than 40 ounces; but the atrophy is most marked in the frontal lobes, especially in their lateral aspect. As a result of this atrophy there is great excess of cerebro-

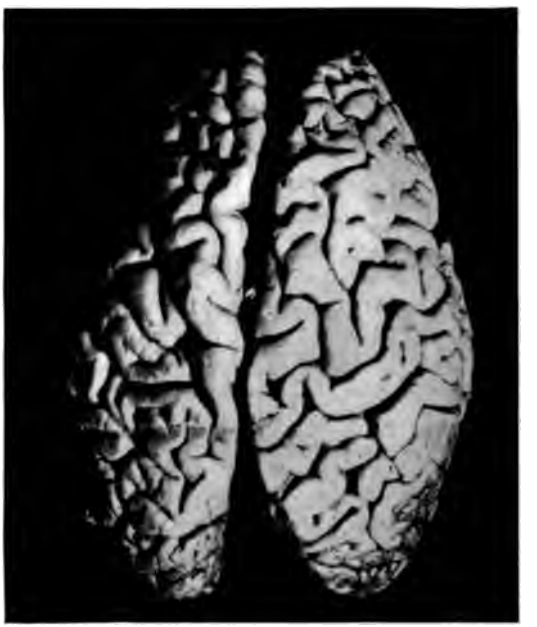

FIG. 69.—SENILE BRAIN FROM A PATIENT FORMERLY OF EXCEPTIONALLY HIGH INTELLECT.

Under observation he showed marked apraxia and agnosia. Note the atrophy of the frontal lobes.

spinal fluid, the ventricles are dilated and the pia-arachnoid, which is usually thickened and studded with large Pacchionian bodies, is œdematous. The pia-arachnoid may be readily stripped from the convolutions without tearing them.

In the abiotrophic cases the wasting of the brain is due to primary degeneration of the neuronal elements of the cortex; in the arteriopathic cases the neuronal degeneration is secondary to thickening of the cerebral arteries.

There is extensive thickening of the bloodvessels throughout

the body, but the cerebral arteries suffer most. The thickening is of the inner coat in the syphilitic, of the middle coat in the arteriosclerotic cases. Miliary aneurisms may often be detected by manipulating portions of the brain in a stream of running water. Following on the arterial degeneration there are frequently small foci of softening in the Rolandic areas of the cerebrum and around the smaller vessels of the basal ganglia, especially of the lenticular nucleus. These frequently present on section a spongy aspect from dilatation of the periarterial spaces (*état criblé*). Microscopic examination of the cortex reveals extensive, at first pigmentary, degeneration of the nerve-cells, best seen in the motor area, with consequent degeneration of motor fibres of the corona radiata. Accompanying these changes there is extensive proliferation of neuroglia, especially in those parts where the felt-work is normally dense; for example, just beneath the ependyma. The cortex is infiltrated with spider-cells (scavenger-cells of Bevan-Lewis). Macroscopically this sometimes gives rise to a slightly frosted appearance of the floor of the fourth ventricle. Small cysts may be found in the choroid plexuses.

Microscopic examination of the medulla and spinal cord reveals similar changes, degeneration of motor cells and fibres. There is even some degeneration of the myelin sheaths of the peripheral nerves.

The kidneys being usually cirrhotic, the renal cortex is thinner than natural and may contain a few cysts.

Treatment.—Arteriopathic dementia is an organic cerebral disease; the treatment therefore can but consist of careful and kindly nursing with attention to the patient's physical requirements and the administration of mercury and potassium iodide in syphilitic cases. Alcohol and tobacco should be avoided. The latter appears to be especially harmful to some of these patients, producing great confusion for an hour or so after smoking.

The most important question which arises in cases of senile dementia is whether asylum treatment is necessary or not. To the author it appears desirable that considerable effort should be made to retain the patient in his own home, for it is surely a sad and serious thing that an old man should end his days, separated from home ties, in an institution for the insane. Of course, every case must be considered on its own merits; unfortunately the difficulty of nursing these patients at home is often insuperable and they are after all better off in an asylum.

CHAPTER XI.

PARANOIA.

PARANOIA is a mental disorder which is to be regarded as a constitutional anomaly rather than a disease. It is characterized by the progressive development of systematized delusions, due to an abnormal emotivity or sensitiveness in certain directions.

In an earlier part of this volume (p. 90) I have endeavoured to show that judgments may be formed, not as the result of observation or logical reasoning, but as the result of an emotion, a mere feeling that this or that proposition is true. Such is the condition with which we have to deal in paranoia; with this difference, that the erroneous judgments of the paranoiac are dependent, not on passing emotions or moods, but on the patient's habitual emotional attitude, on his temperament. Is the man naturally suspicious, ambitious, jealous, vain or hypochondriacal? He finds reason for his ambition, suspicion, jealousy, vanity or hypochondriasis. Erroneous judgments, at first of a vague nature, develop in consonance with his abnormal temperament. His emotional interest is ever being aroused by incidents which appear to justify him in the opinions he holds. Incident after incident is misinterpreted and the misinterpretations are woven into a coherent web until the whole of his mental life is inextricably bound in a systematized network of delusions.

Etiology.—The development of the disorder is so insidious that in most cases it is difficult to determine the age of incidence; roughly paranoia is a disorder of the fourth decade. It occurs more frequently in men than in women. A history of insanity in the family may be obtained in rather more than half the cases.

The patients are more often single than married and a solitary

life apparently predisposes to the condition. I say 'apparently', because there is here a possibility of confusing cause and effect. For however obtrusive paranoiacs may ultimately become, we know that in the earlier stages of their disorder they are peculiarly liable to sink into themselves in solitude.

In a few cases mentation has been enfeebled by a previous attack of mental disease or by some bodily illness. The beginning of the disorder is sometimes referred to a definite incident. For example, one patient's deterioration was said to date from an occasion when certain articles were stolen from the pavilion of his cricket club; in another case the first symptom was alarm at or suspicion of a certain unknown woman's motive in staying unduly long at Mass in the Madeleine at Paris during the patient's visit to the church. Occasionally the onset of the disorder is determined by a dream which is accepted by the patient as a reality. For example, an unmarried female patient dreamed some eight years before she came under observation that she was in bed with a man; this dream laid the foundation for the delusions that her brother admitted men into her bedroom at night, that she had had six children and that, at the time of observation, she was pregnant with twins.

Symptomatology.—On account of the slow insidious development of paranoia, it is usually four to six years before the relatives of a patient realize that he is suffering from mental disorder and the advice of a physician is sought. We have therefore little opportunity of studying the psychosis in its early stages. The history generally reveals that there has been insomnia at night and incapacity for steady work during the day; the patient may further have been regarded by his friends as eccentric, but not insane.

When he comes under observation the most careful physical examination reveals nothing abnormal, with the exception perhaps of a certain unsteadiness of gaze which I have noted in some cases.

Cutaneous sensation, vision, hearing, smell and taste are all normal; there is neither anæsthesia nor hyperæsthesia.

The patient is well orientated and there is no deterioration of the perceptive faculty. Hallucinations do not occur except with rarity in a few patients suffering from delusions of persecution. On the other hand, there appears to be an abnormal excess of the perceptive faculty. From the commonplace

salutations of his friends he concludes that he is a greater man than he had hitherto supposed; in some chance preoccupation of his wife he sees evidence of her infidelity; in a colleague's assistance in his work he perceives a hint that he is neglecting his duty; in a flower worn by a lady he sees a sign that she is in love with him; in books, papers and placards he sees many hidden references to himself; a group of poverty-stricken children is, for him, a call from God that he should become a social reformer; an attack of breathlessness after running for a train is an indication that everybody, not only himself, eats too much meat.

This excess of perception is determined by a prevailing emotional tone which varies from patient to patient, ambition, jealousy, love or suspicion; but apart from this there is no disorder of emotional reaction.

The essential characteristic of paranoia being disorder of judgment, the patients have no insight into their mental condition.

It has been ascertained by Cattell that association-time is prolonged in paranoiacs. The observation may be taken for what it is worth. I have not seen the original paper, but the criticism which at once suggests itself is that it is not fair to compare the time-reactions of the insane with those of practised observers in the psychological laboratory.

The association of ideas is influenced by the patient's customary emotional attitude and the whole of his mental life is dominated by his particular delusion. Otherwise the train of thought is normal; the patients are capable of carrying on conversations and discussions rationally, provided the topics have no reference to their particular delusions. Paranoiacs can play games of skill as well as, and often better than, normal individuals.

The memory is good. Incidents are correctly remembered, although the import or meaning of these incidents may be misinterpreted in after-years when the mental disorder has become established.

The conduct is influenced by the delusions. The patients may disguise themselves so as not to be recognized by their supposed persecutors, they appeal to the magistrate for advice as to how they may escape them or travel about from place to place in order to avoid them. One patient journeyed from Hastings to Newcastle, stopping at many towns on the way, in

search of an unknown lady-love. Mattoids and religious paranoiacs often take to preaching in the public street, writing to the papers and distributing pamphlets in which they air their particular fads. More aggressive natures take up the battle with their supposed enemies and retaliate by every means in their power. Paranoiacs are the most dangerous patients with whom we have to deal.

Yet there is a class of so-called 'resigned paranoiacs' who accept the situation of being detained in an asylum and patiently wait the time when the doctors and others will realize their mistake and set them free. It is however necessary to bear in mind that some such patients are suicidal.

The paranoiac may be excessively garrulous; otherwise speech and articulation are normal. Similarly these patients are apt to write letters of inordinate length, not uncommonly fifty pages of foolscap. The letters are coherent and the calligraphy is unaltered.

On the foundation of an ill-balanced temperament and disordered perception there is erected a coherent system of delusions, the import of which forms the basis of classification of paranoiacs. Disorder of judgment is the characteristic feature of paranoia.

There are two large classes of paranoiacs:

1. The eccentrics or mattoids;
2. The egocentrics including
   - (*a*) Persecuted paranoiacs,
   - (*b*) Querulant paranoiacs,
   - (*c*) Exalted paranoiacs,
   - (*d*) Religious paranoiacs,
   - (*e*) Amorous paranoiacs and
   - (*f*) Hypochondriacal paranoiacs.

Of the two classes the former is probably the larger. We see more of the latter in asylums because egocentric delusions are on the whole more liable to lead a patient into open conflict with society and to necessitate his sequestration.

The ECCENTRICS or MATTOIDS are people with wild, altruistic, impersonal theories to which they give vent in voluminous books or in harangues to crowds in the open spaces of the town in which they live. But all their activity leads to nothing; they are regarded simply as faddists or cranks and no further action is taken. They are full of absurd projects and utopian

ideas ; they preach socialism, anarchy, revolution, ' back to the land ', vegetarianism, anti-this, anti-that and anti-the-other-thing. Some are engaged in grotesque inventions ; one patient went so far as to present a specification to the Patent Office for manufacturing gold from husks of corn.

The essential characteristic of the mattoid is that his view of life is distorted in such a way as to lead him to exaggerate the importance of trivialities, in popular parlance, to ' make mountains out of molehills '.

These are the so-called ' borderland ' cases of insanity.

EGOCENTRIC PARANOIACS, as the appellation implies, suffer from delusions in which their own personality plays the most important rôle.

Delusions of persecution are the natural outcome of a suspicious temperament. For the suspicious man there lurks in everyday incidents a hidden meaning of ill-omen. People sitting at their windows are there to watch his movements, a carious tooth is the result of secret poison, the non-success of a commercial venture is the work of an enemy, policemen on the beat at night are keeping a special watch on his doings, small groups of friends in conversation are discussing his fate and questions in Parliament secretly refer to his evil influence on the State. In this way the patient gradually arrives at the conclusion that a secret society, such as the Freemasons, or a religious body, such as the Jesuits, is conspiring to do him injury. In other cases he accuses whole nations of plotting against him ; in yet others the conspiracy is world-wide. On the other hand, some patients fix upon one particular person as being the cause of all their troubles.

Querulant Paranoia.—When a paranoiac imagines himself to be persecuted by a single individual he himself is liable to turn persecutor. He calls at the house of his victim at all sorts of opportune and inopportune times ; and when the door is closed on him, as in due course it invariably is, he lies in wait for his supposed enemy or follows him about wherever he goes, in order to air grievances, to threaten him or injure him in some way, perhaps to murder him. He also writes threatening letters and, if he is a man of sufficient means, brings the case into court and claims damages. He loses but resolves to carry on the case and takes it from one court to another, squandering his money in litigation. These patients do not hesitate to

forge incriminating documents and to bring them forward as evidence; they may even bear false witness in court to attain their ends, for it is characteristic of them to disguise the truth.

They fill reams of paper in setting forth their complaints to persons in authority, and in speech they are voluble or even eloquent. Pride and self-esteem dominate their character; they believe themselves to be incapable of doing wrong. As a result they become hypercritical of the doings of others and, when they find themselves sequestrated in an asylum, they are a plague to the institution. They criticize the routine, get up trumpery charges against the attendants and write complaints against the medical officers to the Commissioners in Lunacy.

Delusions of exaltation are almost sure to appear sooner or later in conjunction with delusions of persecution. The patient begins to look around for a reason why so many people should be interested in his downfall and some chance incident gives him the clue. People make way for him as he enters the theatre, showing that they recognize him to be a person of importance; a chance resemblance to a portrait of some member of the royal family proves that he is of royal descent; a person of the same name inherits a fortune, clearly indicating to the patient that he himself is the rightful heir and that the possessor of the fortune has assumed his name; the congregation rises and the organ peals at the moment when he enters the church because he is a prophet of the Lord, or he is awarded bedroom No. 3 on his entry into the asylum for the reason, obvious to him, that he is a member of the Trinity. But delusions of exaltation are not always a sequel to delusions of persecution; they frequently arise contemporaneously with or independently of such delusions. In some cases the patient fixes upon an accident in his remote past which suggests the possibility that he is a great personage. One patient, for example, recalled an occasion when a party of children at play, including himself, was stampeded by a runaway horse. After forty years the possibility occurred to him that, on being subsequently claimed by their respective mothers, these children might have been exchanged and that he might be the heir to a dukedom. Possibility became probability and probability became certainty that he was in reality a duke.

Religious Paranoia.—Some patients devote their attentions to the religious side of life. They feel that they have a call

from God to lead sinners to salvation. They become prophets, mystics or spiritualists and believe that they are in communication with the unseen world.

Amorous Paranoia.—In this condition we have to deal with a class of patient who falls in love with some member of the opposite sex and believes his or her love to be reciprocated, although the object of admiration has never wittingly given any justification for such a supposition. A casual glance, a change of dress or a flower in the buttonhole is taken to mean that the patient's attentions are favourably received. He addresses poems and love-letters to his supposed sweetheart; and when they are returned and he is told in writing that he can entertain no hope of requital he considers that this is done to try the strength of his affection. Accordingly he becomes more importunate, determined and even threatening. Ultimately his attentions are so aggressive as to necessitate his removal to an asylum.

Somewhat similar to the above are those patients who disown their parents and claim to be admitted into the circle of another family. There are also patients who fix upon an unfortunate individual and become the torment of his life by wishing to claim him as their son.

Hypochondriacal Paranoia (Hypochondriasis). — There is a small number of egocentric paranoiacs whose over-sensitiveness has reference, not to the behaviour of others, but to that of their own organism. From their youth up they worry unnecessarily about the condition of their health, exaggerate trivial abnormal sensations into important symptoms of some terrible organic disease, read patent medicine advertisements and other such publications, discover in themselves all the symptoms therein suggested and accordingly buy and take any number of quack nostrums. The condition is progressive and the patients may finally reach a state in which they believe day after day, year in and year out that their last hour has come in spite of their perfectly healthy aspect and reassurances on the part of their friends. They constantly want the doctor to examine them in the hope that he may be able to discover the cause of their wretched condition. In reality they are in good physical health and inordinately fat; for their appetite, of which they take full advantage in order if possible to keep themselves alive, is enormous.

Some of these patients rail at the doctors for not paying more attention to their case, for not discovering the cause of their illness or for giving them the wrong medicine. Some even ascribe their condition to a particular bottle of medicine which he gave years ago. They then become querulant paranoiacs, persecute their doctor, threaten him, sue him for damages in a court of law or even make attempts on his life. Hypochondriacs sometimes attempt suicide, not to end their misery, but to draw attention to their case. They do not as a rule intend that the attempt should be successful, but occasionally it is. Under such circumstances the jury returns a verdict of suicide whereas the truth of the matter is that death was accidental.

Diagnosis.—Paranoia is recognized by the slow, insidious nature of its beginnings and the chronic progressive systematization of the delusions on which the patient bases the whole of his mental life. It is to be distinguished from the somewhat similar delusional states occasionally arising as a sequel to attacks of intermittent insanity by the definite history of an attack of mania or melancholia in the latter. Should the patient have been seen before the physical signs of mania or melancholia have disappeared, there can scarcely be any difficulty in the diagnosis.

Dementia paranoides is distinguished by the presence of mannerisms, negativism and other signs of dementia præcox and also by persistent hallucinations and their important rôle in determining the character of the delusions.

Alcoholic paranoia is differentiated from true paranoia by its much more rapid onset and by the history of alcoholism which is usually obtainable.

General paralysis, which may occasionally present symptoms suggestive of paranoia, may be recognized by the occurrence of characteristic physical signs of that disease.

Prognosis.—Paranoia is a hopelessly progressive condition with little tendency to dementia. There is never any hope of recovery.

Pathological Anatomy.—Paranoia being not a disease, but merely a deviation of the patient's mental equilibrium from that which is customarily regarded as normal, there is no discoverable pathological basis of the change in the patient's judgment. Some congenital modification in the arrangement of the cerebral convolutions is usually to be found and, according

to Morselli, an increase of the constituent elements of the association areas.

Many of the patients exhibit physical stigmata of degeneration.

Treatment.—This reduces itself to palliation of the patient's condition and, for the protection of society, his permanent sequestration in an asylum where he can be given sufficient work to distract his attention from his troubles.

COMMUNICATED INSANITY.

FOLIE À DEUX.

This is a state of affairs in which two, or sometimes more, people intimately associated with one another mutually develop what appears to be identically the same mental disorder, usually delusions of persecution. The subsequent history of these patients usually discloses the fact that one of them is a paranoiac and has induced the other to believe in his delusions; in other words, he has communicated his insanity to the other. In order that this should happen it is essential that the two patients should have been intimately associated, should have many interests in common, view life from similar standpoints and have isolated themselves from the outside world. Accordingly we find that *folie à deux* occurs in two members of the same family, sisters, brothers, father and son, mother and daughter or perhaps husband and wife.

It must be understood that the occurrence of insanity in two members of the same family and as a mere coincidence at the same time does not constitute a case of *folie à deux*. It is necessary that the mental disorder of one patient shall be directly due to the persuasive influence of the other. For example, when a woman becomes maniacal on account of the mental anxiety caused by nursing a maniacal sister, that is not a case of communicated insanity because it is not induced by the other patient's persuasive influence.

It is said that the delusions are as a rule not so strong in one patient (the passive element of the couple) as they are in the other (active element).

The following is a good example of communicated insanity:

Two unmarried sisters, aged respectively twenty-six and thirty, lived together in a small house in a London suburb. Gradually they came to neglect their social duties, failed to call

on their friends and, as a natural result, did not receive visits themselves. Then they felt neglected, thought that their friends wished to have nothing to do with them, that some scandal concerning them was rife, that they were being persecuted and that they should come to some harm. At this stage they drew up the following document :

'*September* 25, 1905.

'I, A. B. C., and I, D. E. C., do swear that the statement written below is the truth, the whole truth, and nothing but the truth. If anything happens to us by violence, it will be by the instigation of the Rev. F. G. H., through his agents and the Secret Society to which he belongs. We have been hunted down since the year the Queen died by the aforesaid agents systematically day after day, week after week, taking our name away and shutting all doors on us. The reason of this is that his methods and their methods are criminal, and they have used them on us uselessly until to-day, when I called at —— Vicarage, and now the verdict has gone forth to two next door neighbours: the I. J.'s and their servant K. L., who are in their pay, given to them by old M., who, I conjecture, is one of their chief agents, and who I only imagine is largely responsible for the N. suicide—their aim is money and power ; they have marked all the rich families in England with " XX " to my knowledge, to marry crooked-mined [? minded] women to straight men running to kill them, then the money falls into their hands. I have been told to emigrate for a year to South Africa and then return, but there would be no return.

'M.'s son set off a raid against us last Tuesday to Q—— [a neighbouring suburb].

'The murder in to-day's paper was no suicide on the Brighton line.'

Matters were brought to a climax when on a certain day these patients expected their house to be attacked. At 1 a.m. they heard a noise, threw up their windows and shouted for the police. The police arrived and tried to force an entrance, but the two sisters kept them at bay for two days with a couple of ancestral cavalry swords. The police were ultimately successful and the patients were placed under care.

They were put into separate wards, but for many months were so reticent about the whole affair that it was impossible

to say which was the worse of the two. The younger sister recovered in ten months, the elder is still under care.

The **prognosis** is good for the passive element ; but the active element, being usually a paranoiac, does not recover. It is usually impossible during the early stages to determine which patient is the active element, which the passive and therefore which patient is going to recover.

Treatment consists of separating the two persons and attending to their general health. The separation must be continued after recovery because the passive element is for ever afterwards under the dominion of the active.

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CHAPTER XII.

PSYCHASTHENIA.

Irrepressible Thoughts, Fears and Impulses.

In an earlier chapter it has been pointed out that man is possessed of an enormous number of instincts; more, in fact, than any other animal. It was further pointed out that in states of degeneracy control of the instincts is liable to be weakened. In the class of patients about to be considered the mental state is such that some particular instinct is so uncontrollable and predominates to such a degree that it becomes a real annoyance to the person possessing it.

This abnormal mental state is occasionally experienced by perfectly normal people. To take some of the most frequent examples: When we hear a catchy tune, we instinctively sing it over several times 'in our heads'; but occasionally this process repeats itself over and over again in spite of every effort being made to put a stop to it, so that the tune 'runs in the head' for days or even weeks together. The same happens in the case of catchy rhymes, the classical example being Mark Twain's

> 'Punch, conductor, punch with care,
> Punch in the presence of the passengare'.

It is instinctive in man to step over ditches, holes and such-like gaps when he is out walking; and a burlesque of this instinct takes place when he adjusts his steps to avoid walking on the cracks between paving-stones. If during this process he should by mischance happen to step on one of the cracks, he experiences a certain amount of dissatisfaction. Yet why should he experience dissatisfaction when he knows perfectly well that it does not matter? And why should he put himself to all this trouble when he well knows that it is unnecessary? It is for

no other reason than that he cannot help it. An instinctive irrepressible impulse was foiled.

The instinct of the preservation of property is probably responsible for a man getting up several times in the middle of the night in order to make sure that he has locked the front-door or that he has properly turned off the gas. The instinct of secretiveness probably accounts for a man opening and re-opening envelopes which he has addressed, in order to make sure that he has not put his letters in the wrong ones. These are examples of irrepressible fears occurring to normal individuals.

It is conceivable that even the above obsessions might develop to such an extent that mentation could be no longer regarded as normal. If the tunes or the rhymes became so persistent that the man could not attend to his business or if he spent all his nights going to and from the front-door or attending to all the gas-taps in the house, his instincts would have become such an annoyance to him that he would surely seek his medical man for relief.

Obsessions are not the result of a *persistent* emotional tone and are not themselves persistent; they come on in attacks. The fears of impending harm experienced by melancholiacs are not obsessions, nor are the impulses of maniacs and patients suffering from dementia præcox. Perhaps the most important difference between psychasthenia and the fears and impulses incident upon other varieties of mental disorder is that in the latter there is no attempt to control them, whereas in the former the sufferer realizes the groundlessness of his dread, endeavours to overcome it and, in the case of an impulse to do something wrong, tries to resist it.

Etiology.—A history of insanity in the patient's family is obtainable in about 60 per cent. of the cases. Apart from this the disorder is usually traceable to some incident in the patient's past experience, which has determined also the nature of the obsession. Physical ill-health is sometimes a determining factor.

Irrepressible Thoughts.—These commonly take the form of philosophical questionings arising from the instinct of inquisitiveness, such as: 'Is there a personal God?' 'If so, who created Him?' 'Was there ever a beginning of all things?' 'If so, did time exist before that?' These questions constantly recur and cause real mental unrest to the patient. Régis and Pitres refer to a man who suffered mental anguish from the recurring thought

that the Kaiser Wilhelm or the President of the Republic had to smile five hundred or a thousand times at a reception. Hack Tuke has recorded the case of a London undergraduate who was constantly worried by the question where the word ' not ' should be placed in a sentence containing it. These are a few examples ; there is of course no end to the thoughts that may obsess a patient.

Irrepressible Fears.—Most of the instincts have to do with the avoidance of that which is unpleasant, such as dirt, vermin and certain other animals, the avoidance of articles which may be injurious to the individual or to others, such as firearms, needles and pins, and the avoidance of doing injury to one's self or to others in any way ; such instincts as these become irrepressible when a patient suffers from the morbid fears now under consideration. Most of these conditions have received, perhaps somewhat unnecessarily, specific names.

The fear of dirt (mysophobia) which appears in many forms is the commonest of all. Patients suffering from this obsession are fairly comfortable so long as everything and everybody near are still ; but, should anybody be moving in the room, they fall into a state of mental anguish lest some of the dust raised by the movement should fall upon them or their clothing. Some shake their clothing every few minutes. Others avoid handling it, or any other articles for that matter ; and should such action become necessary, they wash their hands afterwards. Consequently they wash fifty times a day or more. They are quite capable of appreciating the absurdity of their actions and attitude of mind and they may often attempt to resist the impulse to wash. A struggle between instinct and reason ensues and they remain in that most distressing of all emotional states, doubt, from which there is no relief for them until the hands are washed. The appearance or knowledge of the existence of a small piece of dirt of any kind causes them mental anguish and is sure to lead to a fusillade of questions. At the time when gas was the illuminant at Bethlem, one patient required to know at lighting-up time what had become of each match used for lighting the gas lest by some mischance a small piece of charred end might be floating about the ward and ultimately come in contact with herself or her clothing. Not content with the assurance that all the burnt matches had been put in the fire, she would require a detailed account of what would happen if they had not been put in the fire.

In another patient the disorder was initiated by her finding a bug among her clothes. From that time she developed an abnormal dread of coming in contact with such vermin. The weekly change of bedding caused her much distress on account of the possibility that a bug might find its way into her room from the laundry. Such patients, if not looked after, will not change their clothing from one year's end to another.

Owing to the dissemination of medical knowledge by the lay press in recent years the fear of microbes is becoming rather common. When the microbic origin of cancer was on the *tapis* I had a patient who feared that she might have the cancer microbe on her. Being of an altruistic nature, her main idea was to avoid contaminating others. If a plateful of food was placed before her, she took care to eat until the plate was clean. She would rather eat fish-bones, nut-shells and egg-shells than run the risk of allowing any food touched by herself to come into contact with others ; and she suffered mental torture when she was prevented from eating such refuse. Subsequently, of course, her food was always specially prepared for her and all extraneous matter first removed.

The appearance of a cat causes mental anguish to some people. One of our greatest generals, a man who knows no fear in the presence of a death-dealing foe, suffers from this.

That hallucinations may occur in this disorder is obvious from the fact that some of the patients see dirt, vermin etc. where there is none. The following case is of interest on account of the development of psychomotor hallucinations in association with it :

The patient was an unmarried woman, aged twenty-eight, and her illness dated from an occasion when some pieces of glass from a broken lamp fell into the bath at her home. At first she developed the fear that the glass might not have been all cleared away and that some fragments might find their way into her vagina. Then she feared that some insect might crawl there during sleep and breed ; especially she feared that she herself might accomplish this end during sleep by unconsciously introducing hair or other material contaminated with microbes. Psychomotor hallucinations then developed in which she used to feel her hand move to her head and pull out hairs, although she could see that her hand and arm were motionless by her side. The patient recovered after treatment for about two years.

Agoraphobia or fear of open spaces is a condition in which the patient suffers from a feeling of oppression, perhaps accompanied with palpitation, cold sweats and tremors whenever he passes into an open space such as a public square or street. Claustrophobia is a state in which the patient suffers from similar symptoms when he is in a confined space such as an ordinary room or a railway-carriage. Acrophobia is an abnormal fear of heights; nyctophobia, fear of the dark. Some people have a similar sense of oppression when they are in a church or a theatre, crossing a bridge or in a crowd. Stage fright is a phenomenon of like nature. The insane fear of glass has received the name of crystallophobia.

There are some patients who suffer from the fear that an organic reflex over which they have no control may occur in unsuitable circumstances. The most common form of this obsession is the fear of blushing (ereutophobia) on meeting strangers, the natural result of such fear being that the patient does blush. Another common form is coprophobia, the fear of evacuating the bowels when visiting other people or in a theatre or at church (church diarrhœa). Here again the fear that such a thing should happen produces the dreaded result.

An insane dread of doing or having done some harmful action is a common form of obsession. Such patients may fear that they have destroyed something valuable. A clergyman was compelled to visit all the communicants every Sunday afternoon after he had administered the Sacrament, to satisfy himself that he had not accidentally dropped any pins into the chalice and thus caused them to be swallowed by communicants. The same patient, if he had passed an open inkpot, would get the notion that he might have pushed somebody into it. He realized the absurdity of such an idea and resisted the temptation to go back and look into the inkpot, but resistance was useless: he suffered mental torture until he had gone back and satisfied himself that there was nobody in the ink. This case illustrates the relationship between the irresistible fears and irresistible impulses below mentioned.

Irresistible Impulses.—Here we have to deal with states of mind in which the patient feels impelled to perform certain acts against his will. Arithmomania or the impulse to count is one of the commonest; the patient may have to count ten before he answers a question; he counts his steps, the number

of windows in each house he passes, the number of rungs on a ladder etc.

There are people who are impelled to read every piece of printed or written matter they come across, resist how they will. If they go for a walk they spend most of their time reading posters of all kinds. If they see any person reading a private letter they are impelled to go and read it over his shoulder. A man living in a suburb in the North of London, anxious to free himself from this habit, deliberately avoided reading a poster in the Strand on his way home from business. He reached home and had his dinner ; but the fact that he had not read the poster haunted him to such an extent that, before he could retire for the night, he was obliged to travel back to the Strand, a distance of about seven miles, in order to obtain relief from his mental unrest.

Dipsomania is another form of the disorder. It comes on in attacks during which the patient is unable to resist drinking alcoholic beverages to an inordinate extent, although he is anxious to abstain. Kleptomania is a recurrent impulse to steal ; pyromania, a recurrent impulse to set things on fire, commonly haystacks, heaths, commons and houses. Some are periodically impelled to mutilate animals, usually horses and cattle. Others again are impelled to commit homicide or suicide. Patients of this latter class usually present themselves at asylums and mental hospitals as voluntary boarders asking to be taken care of until the impulse has passed off.

It is curious that in the homicidal cases the patient is usually impelled to kill none but his own children. Even in the case of a man who has married a widow with children of her own whose livelihood depends on the patient, he has no impulse to kill the latter. This fact appears to suggest that the homicidal as well as the suicidal impulses are an effort on the part of nature to get rid of the unfit.

To sum up, the characteristics of this form of mental disorder are :

1. Incessant recurrence of the obsession.
2. Resistance which almost invariably proves to be useless.
3. Mental anguish while the struggle between instinct and volition is going on.
4. Relief when, for better or worse, the struggle is over.

There is no disturbance of sensation in obsessional cases and

perception is normal except for the rare occurrence of hallucinations. The judgment is sound, there are no delusions, the patients have clear insight into their condition and there is no disturbance of memory.

The conduct is normal between the recurrences as also is emotional reaction and there is no change in the temperament. In other words, between the recurrences the patients are perfectly capable of managing themselves and their affairs and of attending to their ordinary duties.

Insomnia sometimes occurs and may be troublesome.

Except for some exaggeration of the tendon reflexes, there are no physical signs known to be specially associated with the condition.

Prognosis.—Left to themselves these patients seldom, if ever, recover; and the prognosis is to be regarded as unfavourable if the obsessions have lasted more than a year before the patient comes under treatment.

If however the patient is treated soon after the development of the disorder, the outlook is much more hopeful. Patience and perseverance are requisite, for recovery seldom takes place in less than one and a half to two years.

Pathology.—There is no morbid anatomy of the disorder. Its psychopathology is that we here have to deal with a state in which the will fails to maintain a normal amount of control over the instincts. In physical terms this means that the fronto-pyramidal system is insufficiently developed in that it fails to control the cortico-rubral system. We find therefore that the old name for this disorder, aboulia (loss of will-power), is fully justified.

Treatment.—The essential principle in the treatment of this disorder is to place the patient for a long period under such circumstances that there is little or no possibility of his seeing objects, incidents or situations likely to stimulate the particular instinct over which he has lost control. If this can be accomplished outside an institution for the insane, so much the better; for these patients feel their association with degenerates most acutely. Nevertheless they would rather put up with this than be the victims of obsessions for the rest of their days.

Although they are troubled less by their obsessions while following their usual occupation, it is best for them to give it up while undergoing a course of treatment. This consists in

building up their physical health by the administration of a good, plain, nutritious diet and seeing that they get plenty of rest during the day and sleep during the night.

Constipation, anæmia and such physical disorders should be treated on rational lines. Maltine, cod-liver oil and the tonics are useful adjuncts.

These patients obtain much comfort from the doctor's daily reassurances that their fears are groundless and that they may hopefully look forward to recovery. Their gratitude well repays him for the extra time spent in alleviating their sufferings by a daily conversation.

Some hypnotists claim to have been successful in the treatment of psychasthenia ; but in every one of the author's cases in which it has been attempted hypnotism has failed to effect a cure.

CHAPTER XIII.

NEURASTHENIA.

THIS is a disease which makes its appearance in early adult life and is chiefly characterized by an increased susceptibility to fatigue on slight exertion, mental or physical.

Etiology.—The incidence of the disease is slightly greater in men than in women and it usually makes its appearance shortly after the person leaves school and has a certain amount of responsibility. It occurs most frequently among the poorer middle classes whose members have to keep up a respectable appearance on a small income.

In quite a large number of cases the patient's condition is traceable to his parents. One or both of these have either been subject to mental disease or have indulged in excesses of some kind or the mother has during the pregnancy been subjected to some mental shock or physical illness. In other words the patient's store of nervous energy has been 'squandered by his ancestors', as van Gieson puts it.

Symptoms.—When the patient comes under observation there is often a history of masturbation. This is probably to be regarded as a symptom of deficient control indicative of a degenerate nervous system rather than a cause of the disease. There is also a history of loss of weight.

The patients complain of general malaise and state that they never feel well. On inquiry after their health they commonly reply that they 'don't feel very grand'. The complexion is pale and there is usually a slight chlorosis. The eyelids bend to droop. The skin is moister than natural and the palms of the hands are bathed in sweat.

Examination of the chest and abdomen reveals nothing abnormal except one curious and almost constant feature, a 'throbbing abdominal aorta' of which no explanation is forth-

coming. The pulsation of the abdominal aorta is of such a nature that it feels as if the artery were immediately beneath the skin.

On examination of the nervous system there is found to be no loss of sensation nor is there any general cutaneous hyperæsthesia. Isolated spots of hyperæsthesia may, however, frequently be detected. These are commonly situated along the spine and in the submammary, epigastric and ovarian regions. The testicle is also tender in some cases. Not uncommonly there is hyperæsthesia in other sense departments. The patients cannot tolerate a bright light, and noises which are tolerable to an ordinary individual irritate them. They are particularly sensitive to cold, usually have cold feet and wear abnormally thick clothing.

The patients complain of all sorts of pains and other sensations for which no physical basis can be discovered. The head feels numb or empty, there is a sense of pressure on the vertex or a feeling as if a cap were fitted tightly over it. In other cases there is actual headache, but this is unusual. Vertigo, dizziness and palpitation may occur. Pain at the back of the neck is a common feature.

Indigestion is commonly complained of, but investigation usually proves that this is merely epigastric discomfort having no relation to meal-time, and the appetite is good. Sensations of weight and of pain also occur in the legs.

There is no disturbance of perception or ideation and hallucinations do not occur, unless the sensations above described are to be regarded as hallucinations. A few patients, however, tell us that they can see faces when their eyelids are closed. The memory and judgment are good and the patients have a remarkably clear insight into their wretched condition.

The emotional tone is usually one of depression; but some patients become resigned and succeed in maintaining at least an outward show of cheerfulness. In the depressed cases emotional reaction is liable to be excessive; tears are frequent and the patient may even throw himself on the bed and in anguish bury his face in his hands. In a few of these cases attempts at suicide are made.

Some of the patients are apt to be irritable, aggressive and quarrelsome; they are exacting in their demands and take pleasure in giving trouble to others.

Distractibility is a marked feature. By this is meant that, while voluntary attention is with difficulty maintained, instinctive attention is easily aroused. The result is that the attention is constantly wandering. The cause of the difficulty of voluntary attention is that it is accompanied by an increased sense of effort and therefore of fatigue.

This brings us to one of the main features of neurasthenia, viz., deficiency of voluntary action. The patients are anxious enough to be busy about their affairs like other people; but all effort, mental or physical, leads to an intense feeling of fatigue. In many cases even the thought of doing anything causes the patient to tremble and break into a profuse perspiration (ergophobia). Hence he lies in bed day after day, week after week and month after month; but this prolonged rest does not, at least by itself, relieve the condition. Nor is any benefit obtained by attempting to fight the disease by working in spite of the fatigue induced. The beneficial effect of practice in making the subsequent performance of any particular action easier is wanting in neurasthenia. This symptom is best shown by Weygandt's method. The patient is given a sheet of paper with columns of figures to be added. He starts on the first column and at the end of a minute writes down his result so far as he has gone. Then he passes to the next column, adds for one minute and puts down the result as before, and so on through the whole series. In a normal person, at first the effect of practice is noticeable in that the added portions of the columns get longer and longer until, fatigue setting in, they begin to grow shorter and shorter. In the neurasthenic, on the other hand, the added portions shorten from the very first. Mistakes in the addition also occur earlier than in a normal individual.

Examination with the ergograph reveals that muscular fatigue also sets in early although the records of the first few contractions reach an average height. A special exemplification of this muscular fatigue is the so-called 'irritable eye', the patient complaining that the eyes ache on reading for a short time although no error of refraction is to be found.

Sleep is as a rule fairly good, although insomnia occurs in some cases. Nocturnal emissions are a frequent complaint and are a source of much worry to the patient. Spermatorrhœa occurs also during the day in some cases.

The deep reflexes are usually increased. A peculiar feature of the knee-jerk is that its elicitation commonly causes the patient to ' start ' and sometimes even induces a sharp pain in the back.

The urine is to be regarded as normal since some doubt has been cast upon the statements that the quantity of urea is diminished and that of the uric and phosphoric acids increased.

Diagnosis.—There is a great tendency nowadays, even on the part of many experienced physicians, to label as ' neurasthenia ' all functional nervous disorders which for the moment cannot be pigeon-holed. Doubtless this is partly due to inaccurate descriptions of the disease which appear from time to time. In one description which I have before me, I note that some cases are said to drift into melancholia, others into paranoia ; others again are patients with obsessional insanity, suffering from morbid fears such as claustrophobia and agoraphobia. I need hardly say that these are not cases of the neurasthenia here described. Under these circumstances it behoves us to be very careful in the diagnosis of neurasthenia to exclude all those forms of disease which are liable to be mistaken for it. Not that the diagnosis is to be arrived at merely by a process of exclusion, for neurasthenia is a definite disease with definite symptoms. If, however, care be exercised in the diagnosis, it will be found that it is much less common than is usually supposed.

Chronic nervous exhaustion is the disease which most closely resembles neurasthenia, so closely indeed that the former has received the name of ' acquired neurasthenia '. Chronic nervous exhaustion differs in being a disease of middle life, not a constitutional psychopathic state, and in being usually traceable to some exhausting influence on the nervous system. The other essential difference is that peripheral anæsthesia is present in chronic nervous exhaustion, at least in the earlier stages.

Hysteria is often mistaken for neurasthenia, so much so that hysteria due to traumatism is still called ' traumatic neurasthenia '. Localized anæsthesia and paralysis do not occur in uncomplicated neurasthenia. The presence or absence of hysterical stigmata and the consideration whether the symptoms may or may not be due to auto-suggestion will be of material assistance in arriving at a diagnosis.

Melancholia, especially the hypochondriacal form, is sometimes mistaken for neurasthenia. Such an error is avoided by attention

to detail. Melancholia usually begins at a later period of life than neurasthenia. The neurasthenic does not present the characteristic attitude of the melancholiac; there is no rigidity and the small brisk knee-jerks of melancholia contrast strikingly with the extensive knee-jerk of neurasthenia. Lastly the hypochondriacal melancholiac suffers from delusions about his health and has no clear insight into the nature of his malady like the neurasthenic.

Hypochondriacal paranoia begins much later in life than neurasthenia, and the patients, like the melancholiacs, suffer from delusions and have no clear insight. Nor have they the fatigue symptoms of the neurasthenic.

In any case of persistent headache the physician should always be careful to exclude the existence of *organic intracranial disease* before diagnosing neurasthenia. The optic discs should always be examined for neuritis. Differences between the reflexes of the two sides should put the medical man on his guard.

The early stages of *general paralysis* and *tabes dorsalis* sometimes exhibit a superficial resemblance to neurasthenia. Careful examination of the light reflex and due consideration of the age of the patient are the most important points in the diagnosis.

Osler states that *exophthalmic goitre* may in its early stages resemble neurasthenia. We ought therefore to examine all suspected cases of neurasthenia for von Graefe's ophthalmic sign and for enlargement of the thyroid body.

Lastly it must be insisted that a careful systematic examination of all the organs of the body should be made so as to be sure that the disorder is not due to such conditions as gastric catarrh, phthisis, anæmia or any other such organic disease.

Prognosis.—Once a neurasthenic, always a neurasthenic. Temporary amelioration is sometimes afforded by prolonged treatment, but any attempt to do a good day's work is sure to be followed by a relapse. The disorder does not tend to shorten life.

Treatment.—When first the patient comes under observation it is well to begin with some modified form of Weir-Mitchell treatment. Rest in bed should be enjoined for one month. At the end of that time the patient should be induced to get up for a couple of hours each day, this being gradually prolonged until at the end of another month he is up all day. These patients

are very liable to contract the 'bed habit'. During the first two months visits from friends should not be allowed and letters received by the patient should be supervised, those making unsympathetic or too sympathetic references to his illness being stopped. The patient himself must write no letters.

General massage should be given daily for twenty minutes, gradually increased to one hour. At another time of the day the faradic current may be administered for ten minutes, gradually increased to half an hour. One electrode is placed under the back in the lumbar region while the other is passed over all parts of the trunk and limbs.

During the same period the patient should be overfed in much the same way as a hysterical patient undergoing treatment. As soon as he is accustomed to getting up daily, a cold douche every morning is to be recommended. A cold bath may be substituted later. With the exception of this last, all treatment may be gradually dropped at the end of two months.

The patient should then lead a regular routine life, free from responsibility of conflict, strife and stress. After a holiday in the country he may be well enough to return to his own home. Usually however it happens that his troubles return with the absence of restraint and he is often obliged in the end to seek permanent refuge in an asylum.

CHAPTER XIV.

HYSTERIA.

DISEASE BY SUGGESTION.

THE writing of this chapter was preceded by a good deal of hesitation because it is rare for strictly psychical manifestations of hysteria to be sufficiently marked to justify the removal of the patient to an institution for the treatment of mental disease. It is therefore doubtful whether a description of hysteria should find a place in a text-book of mental disease any more than, for example, phthisis and heart disease, which are frequently accompanied by psychical phenomena. At the present time, however, a chapter on hysteria appears to be rendered necessary by the fact that a great deal of confusion exists in the minds of many physicians as to the differentiation between hysteria and insanity. One of the senior members of our branch of the profession even went so far as to read a paper recently at a meeting of the Medico-Psychological Association stating that he had difficulty in distinguishing between the two conditions. I doubt if there is any form of mental disease which at one time or another has not been diagnosed as hysteria. In many instances this is traceable to a desire on the part of the physician to use the name 'hysteria' as an euphemism for insanity in order to avoid hurting the feelings of the patient and his friends. I would raise no objection to the use of some such euphemism, were it not for the fact that it leads too frequently to erroneous treatment.

The view which is gradually being adopted at the present time of the nature of hysteria is that first enunciated by Babinski some five years ago in the following terms:

'Hysteria is a special psychical state which is capable of giving rise to certain conditions which have features of their

own. It manifests itself in primary and secondary symptoms. The former can be reproduced exactly by suggestion in certain subjects and can be made to disappear under the sole influence of persuasion.'

The secondary symptoms are in direct relation to the primary ones. Conformably to this definition, Babinski excludes from the category of hysteria any symptom which cannot be produced by suggestion.

He has succeeded in showing that all the primary symptoms are the result of auto-suggestion or suggestion by the doctor through his mode of examination. Take hysterical hemianæsthesia, for example. The doctor asks the patient on which side of the body he can the better feel a touch or pin-prick. This suggests at once to the patient that there is some difference in the sensation of the two sides and he is discovered to be hemianæsthetic, usually on the left side in right-handed patients and *vice versa*, the auto-suggestion being presumably that the stronger side is the more sensitive. If, on the other hand, the doctor asks the patient to say *what* he feels while he examines him in such a way as not to lead him to suspect that a comparison of sensation on the two sides of the body is being made, no hemianæsthesia is detected. Of course, the patient must be a new case and must not have made a round of the neurologists and thus learned all the recognized stigmata of hysteria.

Etiology.—Having recognized that hysteria is essentially the result of suggestion, a fact, by the way, which is well exemplified in those cases in which it occurs in epidemic form in schools, nunneries and remote villages, and that it occurs in persons who are especially liable to be influenced by suggestion, we proceed to consider other factors in the causation of the disease.

It occurs about fifteen times as frequently in women as in men and its incidence is greatest between sixteen and twenty years of age, but it may begin at any age between five and sixty-five. There is usually a history of some neurosis or psychosis in the family.

Superstition and religious excitement may be regarded as etiological factors, hence the disease is less frequent nowadays than in the Middle Ages.

Hysteria may occur as a sequel to some exhausting physical disease or the exciting cause may be found in some fright, shock or disappointment.

Lastly we must make special mention of traumatism, a factor which appears to be peculiarly potent when the question of compensation hangs in the balance. Under such circumstances the disease is sometimes known as ' traumatic neurasthenia '.

It remains to be said that the name of the disease, which was given to it in the dark ages long before its nature was understood, should not be allowed to suggest that the sexual organs have any particular influence on its causation ; they have not.

Symptoms.—The conception of hysteria here adopted precludes us from accepting as primary symptoms of the disease those which could not be induced by suggestion, such as hæmorrhage, œdema, skin eruptions, muscular wasting, anuria and fever. These might conceivably occur as secondary symptoms ; for example, hæmorrhage from the mouth might occur as the result of some hysterical sucking movement. Or a hysterical patient might induce some skin eruption for the purpose of increasing the interest taken in her case ; but such an eruption would be a symptom of malingering rather than of hysteria.

Disorders of Sensation.—Of these perhaps the several varieties of anæsthesia are the commonest. Hysterical hemianæsthesia is usually complete and extends to the middle line. It generally affects all the modes of sensation, pain, touch, heat and cold ; but dissociation is not unknown. As a rule, the special senses of the same side are also involved, viz., hearing, smell, taste and vision (blindness of one eye, not commonly hemianopia).

It can be demonstrated that the patient really does feel on the hemianæsthetic side in some subconscious fashion by testing him in the following way : Tell him that you are going to touch him in various parts of the body and that he is to say ' Yes ' when he feels it and ' No ' when he does not feel it. In some cases the patient says ' No ' when touched upon the anæsthetic side, clearly indicating that he does feel (Janet's sign). Sometimes too the patient may be awakened from sleep by pricking him on the anæsthetic side.

More limited areas of anæsthesia may occur in the limbs, their characteristic being that they are ' segmental '. The anæsthesia reaches as high as the wrist, elbow or shoulder or as high as the ankle, knee or hip on one or both sides. This anæsthesia also affects all the modes of sensation as a rule ; but here again dissociation is not unknown. The limit of the

sensation is represented by a line drawn straight round the limb and there is no shading off: in these particulars, the anæsthesia differs from that which I have described as occurring in states of exhaustion and in some forms of dementia præcox. 'Stocking' and 'glove' anæsthesia occur similar to that found in some cases of peripheral neuritis; but there is this difference, that whereas the limit of the anæsthesia in hysterical cases is the same for all forms of sensation, in peripheral neuritis there is dissociation at the margin, the loss of sensation for pain, heat and cold being more extensive than that for touch. Hysterical anæsthesia never follows the distribution of a nerve or nerve-root.

Blindness of one eye sometimes occurs independently of a general hemianæsthesia, its hysterical nature being demonstrable by getting the patient to wear prismatic glasses of different angles in the two eyes, when he sees two objects instead of one. Hysterical hemianopia also occurs in some rare cases.

Various hyperæsthetic areas, pains and abnormal sensations are common in the region of the trunk, usually on the left side. The ovarian and inguinal regions, the lower part of the breast, the shoulder and the spine, especially over the fifth and twelfth dorsal vertebræ, are the parts most commonly found to be hyperæsthetic. 'Hysterical hip' and 'hysterical shoulder' have a striking resemblance to organic disease of these joints. Some patients complain of cardiac pain, bearing a superficial resemblance to angina. 'Globus hystericus' is a sense of fulness in the throat accompanied by a feeling of suffocation. Elsewhere I have suggested that all these sensations may be due to a peripheral relative anæsthesia permitting the region of the trunk to dominate consciousness.

Disorders of Movement.—Of these, hysterical fits are the most important. The classical description includes two varieties, the 'hysteroid' and the 'hystero-epileptic'.

The hysteroid fit may be preceded by an aura of some simple kind, such as 'globus hystericus' or epigastric sensation, lasting from a few seconds to a few minutes. The patient then falls to the ground, but in such a place and manner as to avoid injury to herself. Rigidity supervenes in which the back is arched so that the patient rests on her heels and occiput only. The arms are extended and the fists clenched with the thumbs outside the fingers or protruding between the index and middle fingers.

This condition lasts from five minutes to an hour or more ; the tongue is not bitten or the urine voided as in epilepsy. The eyelids are tightly closed and any attempt to open them induces yet firmer contraction of the orbiculares. This is likely to mislead the physician into the belief that the patient is malingering, but such is not the case ; the increased contraction is to be regarded as an unconscious instinctive act. If the eyelids can be separated, it will be found that the eyeballs are rolled upward, so that the pupils can only be examined with difficulty. When this is possible, however, it is found that the reaction to light is preserved. The conjunctival reflex is also present. The fits may often be arrested by the application of some strong sensory stimulus such as the electrical wire-brush, pressure over the supra-orbital nerves or in the ovarian region. After a fit is over, the patient on being questioned states that she knows nothing about it ; and there is no reason why she should be disbelieved, for the statements of various patients are in perfect accord with one another. The fits are sometimes preceded by a definite epileptic attack ; an unobserved attack of minor epilepsy ushers in a hysteroid fit probably more often than is usually suspected. This view is supported by the beneficial effect of the bromides in these cases.

The hystero-epileptic fit, which is seldom seen in England, almost invariably begins with an attack of an epileptic character. Then follows an extreme form of opisthotonos in which the patient rests on the soles of the feet and top of the head. After a pause the trunk is violently thrown back on the bed : and this movement, rapidly alternating with opisthotonos throws the patient up into the air many times in rapid succession ('grandes mouvements' of the French). There now follows a stage in which the patient strikes many emotional attitudes illustrating joy, grief, terror etc. The terminal stage is one of delirium in which many hallucinations of vision are experienced. Of all this remarkable display the patient remembers nothing except perhaps some of the hallucinations. The ocular reflexes are retained as in the hysteroid fit and the knee-jerk is present throughout in both forms.

Hysterical fits are followed by a copious flow of watery urine. This phenomenon is to be regarded as analogous to the increased flow which occurs in certain emotional states, such as fear. It is presumably due either to dilatation of the arterioles of the

kidney or to a rise in the general blood-pressure, resulting from contraction of other arterioles.

Hysteria sometimes makes its appearance in the form of more or less rhythmical spasms, the affected part of the body varying in different patients. We meet with jumping arms and legs, salaams, hurried respirations, cough, hiccoughs, barks and other strange noises difficult of description. Coarse and fine tremors are also frequent. Catalepsy (flexibilitas cerea) sometimes occurs as a hysterical symptom and somnambulism is, with some justice, regarded by the French school as a hysterical manifestation. I have observed spasmodic convergent strabismus in a few patients.

Hemiplegia is not very common, but it occurs. It is usually associated with hysterical hemianæsthesia.

Hysterical paraplegia occurs in several forms. When associated with anæsthesia of the legs, it is usually of the flaccid variety. In other cases the legs are rigid (hysterical contracture). In cases of the latter class of many years' duration fibrous adhesions may occur in the joints. The knee-jerks are greatly increased and there may be spurious ankle-clonus. By spurious ankle-clonus I mean a non-persistent clonus of which the first contraction is an extension of the ankle pushing against the physician's hand, the first contraction of a true organic clonus being an active dorsi-flexion of the ankle. Another feature of spurious clonus is that it cannot be elicited by tapping the tendo Achillis put on the stretch, whereas true clonus can be induced this way.

Some patients are able to use all the muscles of the legs perfectly while lying in bed ; yet they cannot use them for standing or walking (astasia-abasia).

Monoplegia, or paralysis of one arm or leg usually associated with flaccidity and anæsthesia, is another common manifestation of hysteria. The paralysis is usually complete and it does not involve any muscles of the trunk ; such a condition cannot be referred to an organic lesion.

Hysterical aphonia (loss of voice) is very common. It is a frequent accompaniment of a common cold : but it also occurs independently of this as the result of shocks, frights and such emotional disturbances. Hysterical mutism is a condition in which the patient is unable to speak at all ; he cannot utter a single word, even feebly.

In all these paralyses the superficial reflexes of the affected area are diminished or absent. For example, the plantar reflex is usually absent in hysterical paraplegia and the pharyngeal reflex in hysterical aphonia, thus rendering laryngoscopic examination easy.

The organic reflexes are sometimes affected in hysteria. Some patients suffer from difficulty of swallowing (dysphagia); others from uncontrollable vomiting, a condition which may end fatally. There is even a hysterical form of constipation, its peculiarity being that it is not relieved by aperients or enemata, the bowels being opened by suggestion only.

Mental Condition of Hysterical Patients.—The disorders of sensation met with in these patient have already been considered. Disturbances of perception are of extreme rarity and the train of thought does not present striking abnormalities. Similarly memory is usually unimpaired.

One of the most important mental characteristics of these patients is emotional instability and excitability. Everything about them has a personal interest and they become elated or, more frequently, take offence at trivialities. They are liable to outbursts of anger or sullenness and often refuse to state the reason for their behaviour. They are egoistic, ever on the look-out for sympathy from others, sympathy which feeds the disease, but which they take as their right; and if they find it not, they will exaggerate their symptoms and even make false statements in order to attract more attention to their case.

Their volition is weak. They make no attempt to combat their disease; indeed from time to time they resist all attempts at treatment.

Lastly the essential characteristic of hysteria is suggestibility. The patients readily develop symptoms suggested to them and in early cases these symptoms are almost as readily relieved. Sleep is usually normal; but should the patient have difficulty in falling asleep, a hypodermic injection of 3 minims of water will give the requisite suggestion.

Hysterical Insanity.—In some rare instances, the above characteristics influence the patient's conduct to such an extent that the authorities of hospitals and nursing-homes refuse to accept further responsibility in the treatment. Under such circumstances the patient has to be removed to an institution for the insane where, if carefully treated, she usually makes a

good recovery. Such a condition, and no other, may justifiably be called hysterical insanity.

Before considering the states which may be classified under this heading, it remains to be pointed out that attacks of mania, melancholia, stupor, dementia præcox etc., are not to be regarded as instances of hysterical insanity merely because the patient has previously exhibited symptoms of hysteria. I have never seen such a case, but if a hysterical patient were to develop some form of insanity as the result of suggestion, I should be willing to call such a condition hysterical insanity. There is little doubt that the patient would not exhibit the characteristic features of any other form of insanity described in this volume.

In the chapter on dementia præcox I have shown that the cataleptic and catatonic symptoms arise as the result of suggestion from without or from organic stimuli within the organism. Bianchi, recognizing the same fact, describes katatonia under the heading of hysterical insanity ; but I am unwilling to accept any close relationship between katatonia and hysteria, because katatoniacs do not exhibit the hysterical character and their previous history seldom or never reveals that they have at any time suffered from the recognized symptoms of hysteria as above described.

The descriptions of hysterical insanity by various authors differ to such an enormous extent that many have been led to state that it does not exist. This statement is not far from the truth. We are bound to recognize, however, that definite mental disorder exists during the terminal stages of an hystero-epileptic fit and similar disorder sometimes occurs without any associated convulsion taking place.

These accesses occur in one of two forms :

(*a*) Hallucinatory delirium.
(*b*) Anterograde amnesia.

Generally they constitute the fourth phase of an attack of hystero-epilepsy, but in some instances they may precede or replace a convulsion.

In hallucinatory delirium the patient sees animals, visions of God or emotional incidents of her past life. She is anæsthetic except to the most powerful stimuli, but is to some extent capable of perceiving the nature of her surroundings. She weaves her hallucinations into them ; in reality she lives in a world of her own. As a rule there is an abnormal amount of activity,

but the patient can usually be induced to recount what she sees. This dream state seldom lasts more than a few hours and when it is over the patient's memory of it is usually incomplete.

In the attacks of anterograde amnesia, to which Pitres has applied the somewhat inelegant name 'ecmnesia', the patient has complete loss of memory for all events after a certain date, often years back. As a consequence she thinks and acts as she did at the age to which she has temporarily returned. These attacks also rarely last more than a few hours.

Prognosis. — In the great majority of cases the physician may look forward with hope to effecting in a few months a cure which, in view of the apparent severity of the symptoms, frequently causes much surprise to the friends. Unfortunately, however, these cases have a great tendency to relapse in home surroundings; but the tendency decreases with advancing age. The duration of the disease does not materially affect the prognosis provided there have not been previous serious attempts at treatment which have failed. A physician undertaking the treatment of a case of hysteria has a heavy responsibility on his shoulders; for, if he fails to cure his patient, he suggests that the case is incurable and makes subsequent attempts tenfold more difficult. Consequently, if a patient has already been treated by many neurologists and spent years in neurological hospitals, she may be regarded as incurable because the suggestion of incurability has been given in its most potent form.

It must not be forgotten that a few cases of hysteria end fatally, especially those suffering from dysphagia, anorexia and vomiting.

Treatment.—Hysteria must be fought on its own ground. Suggestion causes it and counter-suggestion will cure it. It is therefore all-important that the physician should approach a case of hysteria with confidence and determination to establish recovery. Any doubt in the mind of the physician is reflected in that of the patient and suggests incurability. Even if he is tackling a chronic case he must always take care to enter the patient's presence with the conviction that he is going to cure her; and, further, he must convince the nurses that the case is undoubtedly curable lest any chance remark or action on their part should suggest to the patient incurability. It may be necessary for the physician to keep this up for many months; but he is fully justified, for persistence is essential and failure a crime.

The necessary suggestion is given by improving the patient's general health and using impressive forms of treatment. These principles are best carried out in the form devised by Weir-Mitchell. In this method of treatment, cognizance is taken of the fact that home influences are inimical to the cure of hysteria. The patient is therefore sent to a nursing-home, put to bed in a room by herself and allowed to see nobody but the doctor and nurses attending her. She is allowed neither to write letters nor to receive them.

The next aim in the treatment is increase in the patient's weight. This must be accomplished steadily and rapidly so that, each week when the patient is weighed, she is impressed by the large amount of flesh she has put on. To accomplish this, absolute rest is enjoined. Not only must the patient abstain from reading and sewing; she must not receive letters or even be told any news from the outside world, lest it cause a certain amount of worry. Incidentally such stringency also serves the purpose of impressiveness.

The feeding is important. At first the patient must be induced to eat a little more than has been her custom, together with a glass of milk after each meal. The quantity of food taken at each meal is then steadily and tactfully increased, extra glasses of milk being given in the middle of the morning and afternoon and at bedtime. Subsequently cream may be added, at first in small quantities, later as much as 2 ounces in each glass of milk. At the end of a month the patient should find herself taking four good nutritious meals every day as well as 3 to 4 pints of milk with 12 to 15 ounces of cream.

The nutrition is further increased by general massage for twenty minutes gradually extended to one hour every morning during the first two weeks, subsequently for one hour morning and evening. The masseuse will naturally pay special attention to those parts of the body in which the hysterical symptoms are manifested.

Lastly electricity in some form suited to the particular case should be applied twice a day. For example, anæsthetic parts should be treated with the faradic wire-brush, the current being of sufficient strength to penetrate the anæsthesia at least in some small areas; disturbances of motility without anæsthesia may be treated by judicious use of the ordinary electrodes, hysterical

blindness by mild galvanic shocks applied to the closed eyelids, and so forth.

Hydrotherapy is often useful as a subsidiary method of treatment in suitable cases, especially in the form of the cold shower and needle-bath. In long-standing cases which have already undergone many attempts at cure, original devices for impressing the patient must be left to the ingenuity of the physician.

The latter should devote his visits to discovering signs of improvement and letting the patient see them, without obtrusively pointing them out.

As recovery becomes established, massage, electricity, extra milk and the general régime should be gradually dropped and the patient allowed to return to normal life while under the care of her nurses. Indeed it is well that she should go for a holiday with one of them as a prelude to her return home.

It is best to avoid drugs ; but it is of course necessary to regulate the action of the bowels and to see that the patient gets sufficient sleep. It is also sometimes desirable to give before meals an appetizer such as nitrohydrochloric acid combined with the tincture of nux vomica. The bromides are useful in the treatment of patients suffering from hysterical fits, for whom the general treatment of hysteria should be combined with that of epilepsy.

CHAPTER XV.

MENTAL DISORDERS ASSOCIATED WITH ORGANIC BRAIN DISEASE.

In this chapter we have to consider the characters and relationships of mental disorders arising in association with and apparently resulting from—

1. Injury to the head.

2. Embolism or thrombosis of one or more cerebral arteries, whereby some part of the brain is destroyed and dies for want of blood-supply.

3. Cerebral hæmorrhage, abscess or tumour destroying some local portion of the brain-tissue and causing an increase of the general intracranial pressure.

4. General inflammatory conditions such as encephalitis and meningitis.

In many cases of organic cerebral disease the mental disorder conforms to one of the types already described in this manual. In such circumstances the brain lesion is to be regarded merely as a contributory cause of the mental syndrome since the latter presents no characteristic symptoms of a coarse brain lesion. It is to be remarked that the presence of organic brain disease renders recovery improbable, even in cases of an apparently functional psychosis the prognosis of which is usually regarded as favourable. Such cases require no further notice in the present chapter which is devoted to the consideration of the symptoms directly traceable to the brain lesions.

Such symptoms may be classified under three headings, according to their causation by—

1. Increase of intracranial pressure,

2. Cerebral intoxication by products of neural disintegration or

3. Interference with some portion of the cortex which has a specialized function in mentation.

Symptoms of Increased Intracranial Pressure.—These occur in cases of abscess or tumour of the brain, in meningitis and in encephalitis.

Headache is the most common symptom. As a rule this is fairly persistent, but sometimes it is paroxysmal. It is usually worse in the early morning, when it is commonly associated with vomiting; but the headache associated with gummata of the brain is said to be frequently worse at night.

Double optic neuritis occurs in about 80 per cent. of the cases of cerebral tumour and of tubercular meningitis; it is much less frequent in cases of simple cerebro-spinal meningitis.

Vomiting is another fairly constant phenomenon. It appears especially in association with exacerbations of the headache and not uncommonly it is unaccompanied by a feeling of nausea.

Generalized convulsions occur in a small number of cases.

The pulse and respiration are less frequent than normal, the latter being affected more than the former.

The mental symptoms comprise a general retardation of the mental faculties, with slowness of movement, slowness of speech (bradyphasia), slowness of perception, apathy and loss of memory. Puerility is also a somewhat characteristic symptom; the patients are childish in their tastes and like to follow childish pursuits; but they lack the activity and lively curiosity of the child. In the later stages drowsiness sets in and gradually deepens to stupor and coma.

Some of the above symptoms have been ascribed, at least in part and notably by the French school, to intoxication by the products of neural disintegration, but the view is little accepted in this country.

Symptoms of Cerebral Poisoning by Products of Neural Disintegration.—These are the symptoms already described under the heading of Acute Confusional Insanity, to which disease the reader is referred. Here they need only be summarized as follows: peripheral anæsthesia, imperception, disorientation in time and place, hallucinations (especially of vision and hearing), disturbance in the association of ideas leading to incoherence of speech, loss of memory, lack of volition with inability to concentrate the attention, apraxia and degeneration of the instincts, with mischievous and often dirty habits.

Focal Symptoms.—The psychical symptoms associated with tumours of the *frontal lobe* are more liable to occur with

subcortical than with cortical tumours. The symptoms are of two kinds, active and passive.

Among the active symptoms it may be noted that the patients are frequently irritable and querulous. There is loss of control of the instincts and the patients sometimes fall into the hands of the police through degeneration of the moral sentiment. This occurs most commonly in association with tumours near the orbital surface of the frontal lobe. Joviality, inability to take the medical examination seriously, frivolity, and a persistent tendency to jest are said by some authorities to be characteristic of frontal tumours. The symptom has received the names 'Witselsucht' and 'Moria'. Perhaps it arises most commonly in association with frontal tumours, but it may also occur with tumours of other regions.

The passive symptoms of frontal tumour are obtuseness, hebetude and loss of memory.

It is said that the passive symptoms occur more frequently with tumours of the left and active symptoms with tumours of the right frontal lobe. It may now be considered as settled that the physical basis of voluntary action is situated in the left frontal lobe and that apraxia or paralysis of volition indicates disorder (functional or organic) of the same region.

From a neurological point of view tumours of the *corpus callosum* resemble those of the frontal lobes in that they give rise to none of the symptoms looked for by the pure neurologist. There is no disturbance of sensation or movement, or any characteristic alteration of the reflexes; tumours of this region cannot be diagnosed neurologically until they are large enough to involve neighbouring structures; the earliest symptoms are mental. It is not surprising that tumours of the corpus callosum are invariably associated with psychical symptoms when we consider that such tumours interfere, not only with the association fibres constituting the great commissure connecting the two cerebral hemispheres, but also with those of the superior longitudinal bundles. The patients are dull, obtuse and confused. They are disorientated in time and place and there is complete loss of memory for recent events. There is interference with the association of ideas, leading to incoherence of speech. Voluntary action, including voluntary attention, is in abeyance. Judgment is deficient and the patients are quite incapable of mental work of any kind or of sustained physical

work. In other words the clinical picture is that of profound dementia.

Tumours of the posterior half of the cortex of the *left temporal lobe* induce (in right-handed people) word-deafness ; they cannot understand what is said to them (verbal-auditory imperception). A lesion of both temporo-sphenoidal lobes produces complete auditory imperception so that the patient cannot, for example, recognize music or the ringing of bells as such ; but this may also arise from extensive left-sided lesions. Subcortical and supracortical tumours in the neighbourhood of the auditory centre are liable to induce hallucinations of hearing.

Tumours of the *left angular gyrus* give rise (in right-handed people) to loss of perception and ideation of written language (word-blindness). The patients are unable to comprehend the meaning of written or printed words or sentences. Usually they are unable to express their thoughts in writing. They can copy writing into writing and print into print, just as an average Englishman could copy Chinese without knowing the meaning ; but they cannot copy print into writing or writing into print, because such a process involves an act of perception of the nature of the symbols which are being copied. This imperception is for written and printed *language* only ; objects can usually be recognized and named at sight. It is probable that lesions of both angular gyri (right as well as left) produce complete visual imperception. Occasionally complete visual imperception is caused by very extensive lesions of the posterior half of the left hemisphere, involving the occipital and portions of the parietal and temporal lobes with the subjacent white matter.

When a lesion of the left angular gyrus is sufficiently extensive to involve also the posterior part of the temporal lobe, the patient is unable to name objects at sight although he recognizes them and knows the uses to which they may be put. Delirium, stupor and states of mental confusion with hallucinations are especially liable to occur in association with tumours of this region. Lastly subcortical and supracortical tumours in the neighbourhood of the angular gyrus tend to produce visual hallucinations.

Tumours of the *base of the brain* are not especially apt to cause mental symptoms unless they are in the neighbourhood of the pituitary body. In the latter region tumours tend to produce loss of the sexual instinct, with depression and suicidal

ideas. In a few cases there is maniacal excitement or delirium with hallucinations.

Some idea of the frequency with which tumours in various regions of the brain are associated with mental symptoms may be derived from the following table compiled by Schuster from the study of 588 cases of which 323 showed mental symptoms :

	Per Cent.
Tumours of the corpus callosum	100
Tumours of the frontal lobe	79·3
Tumours of the temporal lobe	66·6
Tumours of the pituitary region	65·3
Tumours of the occipital lobe	60
Multiple tumours	59·6
Tumours of the pineal gland	53·8
Tumours of the parietal lobe	52·1
Tumours of the basal ganglia	50
Tumours of the cerebellum	35·5
Tumours of the centrum ovale	28·8
Tumours of the cerebral peduncles	25

The mental enfeeblement which is met with in cases of **cerebral softening** from thrombosis of one or more of the cerebral arteries is an exaggerated form of that which has been described under the heading of arteriopathic dementia.

In **acute cerebro-spinal meningitis** and in **acute encephalitis** a certain amount of mental and motor excitement is liable to occur during the prodromal stages ; but, as the disease becomes established, the patient is more liable to become depressed, this depression being the forerunner of the terminal coma.

The mental symptoms accompanying **tubercular meningitis** are less uniform in character. Some patients are excited and violent, others are depressed, others again develop delusions of persecution. Many patients are delirious and experience numerous hallucinations, while yet others show progressive mental deterioration resembling dementia.

There is no form of mental disorder which may be regarded as characteristic of **head injury**. The cases conform to the types of insanity elsewhere described in this volume and the head injury must be regarded merely as the exciting cause in a predisposed individual.

For the prognosis and treatment of the various organic diseases of the brain mentioned in this chapter the student must consult some work on general medicine.

CHAPTER XVI.

IDIOCY AND IMBECILITY.

THESE are states of arrested or retarded mental development occurring as the result of some disease of or injury to the child *in utero* or during the first few years of extra-uterine life.

For practical purposes it is necessary to recognize that there are different grades of mental deficiency. The subjects are accordingly classified into idiots, semi-idiots, imbeciles, semi-imbeciles or backward children and moral imbeciles.

Cretinism is elsewhere described.

Etiology.—Neuropathic heredity is the most important and most frequent cause of congenital weak-mindedness.

It is said that illness, fatigue and especially drunkenness of the parents at the time of conception are liable to induce idiocy in the child. Also disease of the mother during pregnancy, especially in the earlier months, may lead to a similar result. Injury to the pregnant uterus, often by ineffectual attempts at abortion, is another potent cause inasmuch as it is liable to interfere with the nutrition of the fœtus. In all probability this last factor is responsible for the frequent occurrence of idiocy among illegitimate children.

At birth the brain is liable to suffer injury if the child's head is disproportionately large or the pelvic brim of the mother deformed or disproportionately small so that labour is unduly prolonged. For a similar reason we find that the incidence of idiocy among first-born children is abnormally great. On the other hand the last child of a long series is liable to be weak-minded, the mother's strength and nutrition having been exhausted by frequent pregnancies.

Obstetric manipulations at birth have sometimes been held responsible for producing an idiot; but it is more probable that some deformity of the head of the child destined to become

an idiot has necessitated interference on the part of the obstetrician.

That idiocy is twice as frequent in boys as in girls is probably to be correlated with the fact that the male head has greater difficulty in passing the pelvic outlet and is therefore more liable to injury at birth.

Idiocy may occur as a sequel to some of the acute specific fevers. It is sometimes ascribed to a series of infantile convulsions: a more correct view of the relationship would probably be that the convulsions are symptomatic of an already existing degeneracy or neuropathic tendency of the nervous system.

Most children who acquire organic disease of the brain during infancy remain mentally defective. These are cases of infantile hemiplegia, infantile diplegia, meningitis, encephalitis, cerebral hæmorrhage, meningeal hæmorrhage and diffuse or nodular sclerosis. A few cases are due to congenital syphilis.

Lastly there remains to be mentioned the most important cause of all, epilepsy, which is responsible for about one-third of the cases.

Physical Signs.—These consist for the most part of the physical stigmata of degeneration described in the chapter on that subject. They are numerous and of frequent occurrence in idiots, rather less numerous in imbeciles; but among both classes the stigmata occur with greater frequency than among the insane.

Mental Symptoms—*Sensation.*—One form of idiocy, 'idiocy by deprivation of the senses', is entirely due to the patient having been either born deaf and blind or deprived of the senses of vision and hearing by disease in early life. Without special training such persons are destined to remain mentally deficient because those windows of the soul through which a normal person gains most of his experience of the outside world are permanently closed. These patients are of considerable interest in that it has been shown by praiseworthy tutors of exemplary patience that such subjects may attain a fair degree of mental development through education of the sense of touch alone. In such cases the senses of taste and smell receive no education but are used to indicate to the pupil what is to be regarded as pleasant or unpleasant.

It is to be understood that not all blind deaf-mutes are cases of 'idiocy by deprivation'. Many exhibit the physical

stigmata of degeneration and show evidence of cerebral as well as peripheral deficiency; such cases cannot be regarded as educable.

Deaf-mutism is a condition closely allied to idiocy by deprivation. Children who are born deaf naturally have no means of learning their native tongue and the knowledge that is to be gained thereby; they are therefore destined to become deaf-mutes. They may however be taught the deaf-and-dumb alphabet or, better still, lip-reading; and they may then be educated to such a degree that they scarcely miss the faculty of hearing. The condition is to be regarded as markedly hereditary, liable to occur in members of the same family and especially in the collateral branches Deaf-mutism is more prevalent in goitrous districts than elsewhere and it is three times as common among Jews as among Gentiles.

Blindness invariably occurs in association with the congenital form known as 'amaurotic family idiocy': in these cases the blindness is not in any way a cause of the idiocy as in 'idiocy by deprivation', but rather a concomitant symptom of degeneration of the nervous system. All the recorded cases have occurred in the offspring of Jewish parents. The child goes blind shortly after birth, the ophthalmoscopic appearances being a white patch in the region of the macula with a cherry-red spot in its centre. The process terminates in complete retinal and optic atrophy. This condition is associated with progressive general weakness, almost amounting to paralysis, and terminates fatally at about two years of age.

The disease is liable to occur in several members of one family. Ireland states that of twenty-seven recorded cases, eighteen occurred in twelve families.

Apart from the cases of 'idiocy by deprivation' and 'amaurotic family idiocy', blindness exists at birth or develops shortly after birth in about 6 per cent. of idiots and imbeciles, usually as the result of optic atrophy. Spasmodic squints and nystagmus from various causes are even more common.

Defects of hearing, taste and smell are much less frequent than defects of vision. Defect of hearing is usually due, not to a cerebral lesion, but to malformation or disease of the ear itself. Although anosmia is uncommon, many idiots appear to be incapable of experiencing pleasantness and unpleasantness in association with odours.

It is said that tactile, painful and thermal sensations are sometimes deficient in the severest forms of idiocy. I have not been able to verify this observation. On the contrary, I have observed that painful sensations (pin-pricks) appear to be normally appreciated by idiots, but that analgesia of the distribution described on page 99 occurs sometimes in imbeciles. An imbecile girl, aged fourteen, whom I saw at Tooting Bec Asylum by the kindness of Dr. Beresford, could appreciate painful sensations in the groin and soles of the feet only. She was of sufficient intelligence to explain to me that, though she would not care herself to transfix a portion of her skin with a pin, the proceeding caused her no pain. She had sufficient mental capacity to be able to say the multiplication table up to 'five times'.

Perception.—The perceptive faculties develop either late or not at all. In some of the severest cases of idiocy in which there is no loss of sensation the patients never make use of their senses to gain knowledge of their environment. This is entirely due to want of development of instinctive attention. They see, but they never look; they hear, but they never listen; cutaneous sensations are present, but they are not even localized.

Inasmuch as the instincts and emotions are forms of reaction to percepts it is obvious that these reactions cannot take place in cases of extreme idiocy. Crying occurs, but this is probably a medullary reflex occurring as a response to painful stimuli; it is not a true emotional reaction to a percept.

Severe cases of idiocy may be recognized shortly after birth when it is found that the infant does not seek or even suck the breast. The instincts are all late in appearing so that an idiot child ten years of age may be no further advanced in his development than a normal child of twelve months. Both, for example, would be beginning to utter articulate sounds and to walk and both would be still 'wet and dirty' in their habits.

In children from whom the faculty of perception is absent there is of course no desire to eat and drink; left to themselves they would die of starvation. Similarly the desire to micturate or defæcate is absent; evacuations of the bladder and rectum take place reflexly as in spinal paralyses.

Idiots like normal infants are nearly always asleep.

In imbecility the faculty of perception approaches the normal.

Instinctive attention is present, but the power to attend voluntarily is defective. The emotions and instincts develop normally, but volition being weak they are uncontrolled. Accordingly we find, in agreement with the principles laid down on page 129 that the imbecile has strong emotions and instincts. He is shy before strangers, so much so that in many institutions for weak-minded children it is customary to defer examination for a week or more in order to allow the patient to get over his shyness and to become accustomed to and more or less friendly with the doctor. Imbeciles form strong likes and dislikes and they are very affectionate towards those to whom they take a fancy. They are usually gentle and timid and feel punishment acutely.

The *instincts* in addition to being uncontrolled are liable to be perverted. Some imbeciles take a pleasure in striking or otherwise injuring creatures weaker than themselves, in breaking windows, stealing and indulging their sexual impulses. Lying however is not a common fault, for the imagination as a rule is not sufficiently developed. They can seldom be taught the full meaning of the difference between right and wrong; but fear of punishment is often sufficient to cause them to refrain from immoralities.

The actions of imbeciles are instinctive impulses, imitative acts or the carrying out of simple orders. True volitional acts are rarely seen.

Ideation is mostly of the visual type, but many imbeciles and even idiots can remember musical airs. The train of thought (association of ideas) is of the scatter-brained variety owing to defect of voluntary attention. For the same reason associative memory is always defective.

In many of the lighter grades of imbecility, however, the subjects show a remarkable memory for figures such as dates. Many of the 'calculating boys' belong to this class. It is not known by what mental process they arrive at their results; usually the faculty disappears if they are taught ordinary arithmetic.

Conception appears to be deficient. In the lighter grades of idiocy and the severer forms of imbecility the patient can form an idea, for example, of a chair; having got so far, he is incapable of developing the abstract concept of a chair and of appreciating the difference between one chair and another. For him all chairs are the same. Much less is he capable of

understanding the meaning of such abstract concepts as space, truth and virtue.

With such deficiency of the power of abstraction and discrimination it need scarcely be added that the judgment is feeble and more than liable to be erroneous.

The *vocabulary* of the imbecile is limited. He has names for common objects and a few adjectives but very few verbs, so that he rarely forms sentences. As with the lower classes in this country, adjectives have to do duty for adverbs. In conformity with the egoism characteristic of the imbecile the pronoun ' me ' looms large.

Difficulty of *articulation* is common. Lisping occurs in cases where the hard palate is so deformed that the tongue cannot be uniformly applied to the roof of the mouth. Stuttering and stammering are also fairly common. There is often difficulty in the pronunciation of the gutturals and of the liquids *l* and *r*. Some of these difficulties may be due to the large size of the tongue in many patients.

A fair number of imbeciles may be taught to write, but the calligraphy is seldom good. They usually have difficulty in performing all the finer movements requiring precise co-ordination.

Moral imbecility is chiefly characterized by deficient control of the instincts and a fondness for crime, while considerable cunning and deceit are usually exhibited to evade detection. The egotism of the moral imbecile is unbounded and he is always a conceited braggart, a liar too of the first order.

His memory is good and judgment fair. He is clever at games, usually musical and often artistic, but incapable of applying himself steadily to a profession or trade.

CLASSIFICATION.—The usually accepted classification is that of Dr. Ireland, which is based as far as possible on etiological and pathological considerations.

Genetous idiocy is the name given to states of weak-mindedness due to pathological changes in the brain which have taken place before birth but cannot in the state of our present knowledge be diagnosed before a post-mortem examination is made. Many of the other varieties of idiocy may be of congenital origin, but inasmuch as a diagnosis of the cerebral lesion can be made before death they are not included in this class.

Among genetous idiots Ireland includes the **amaurotic family**

FIG. 70.—R. R., AGED 10 YEARS, AND HIS SISTER, T. R., AGED 14 YEARS. HIGH-GRADE GENETOUS IMBECILES (CAUSE UNKNOWN).

idiots and also those known as **Mongolian idiots,** a large class presenting many of the physical stigmata of degeneration and so-called because of their facial resemblance to the Mongol. Mongolian idiots are especially liable to a form of mucous diarrhœa which occurs in the congenitally weak-minded.

Microcephalic idiocy is idiocy existing in an individual, the circumference of whose head is less than 17 inches (18 according to some authorities). The smallness of the head is due to smallness of the brain and not to premature ossification of the

FIG. 71.—MICROCEPHALIC IDIOT.
Circumference of head = 16 inches.

cranial sutures as was supposed by Lannelongue when he proposed the operation of craniectomy to allow the brain to expand. This operation was performed on many microcephalic idiots without effecting a single cure. Indeed in some cases the head grew smaller as a result of the operation.

Hydrocephalic idiocy is caused by atrophy of the brain substance resulting from pressure induced by an excessive accumulation of fluid within the lateral ventricles, the foramen of Magendie being closed. The circumference of the head is enormously increased. In the congenital form the ventricles are elongated ;

in the acquired form they are increased in their vertical and transverse diameters.

In hydrocephaly the greatest increase takes place at the temples and the distance between the eyes is increased. This feature serves to distinguish it from the rarer condition of inflammatory hypertrophy of the brain in which the greatest increase is above the superciliary ridges.

FIG. 72.—HYPERTROPHIC IMBECILE.

Circumference of head	= 29 inches.
Binauricular diameter	= 12½ inches.
Antero-posterior diameter	= 12½ inches.
Width of forehead	= 4¾ inches.

Eclampsic idiocy is the name applied to those cases in which the state of weak-mindedness is ascribed to a series of fits occurring during the first year of life, generally during teething. It seems doubtful whether such cases merit the distinction of being placed in a separate class. The probability is that they are genetous idiots whose first symptom of cerebral weakness is a series of teething convulsions.

Epileptic idiocy exists as well as epileptic insanity and it is desirable to draw between the two a distinction, which is bound

to be based upon the age at which the mental faculties first show signs of degeneration. Dr. Ireland fixes this age at seven years.

Epileptic idiots can scarcely be regarded as educable. The usual course is that they acquire a certain amount of knowledge ; then there comes a series of fits which obliterate that knowledge and the teacher has to begin all over again, only for the same process to be repeated time after time.

Paralytic idiocy is due to coarse lesions of the brain, usually hæmorrhage occurring at birth or during early infancy. It is associated as a rule with hemiplegia ; but many of these patients are paralysed on both sides of the body (diplegia).

Inflammatory idiocy occurs as the result of a chronic encephalitis. According to Ireland it is usually a sequel to one of the acute specific fevers. In one form of the disease (hypertrophic idiocy) the head becomes enlarged owing to an abnormal increase in size of the whole brain. There is an increase of all its constituents, not of neuroglia only ; but the higher functions suffer on account, it is said, of an increased intracranial pressure caused by the unyielding bony framework of the skull. If this be so, the operation of craniectomy might be revived for these cases.

Sclerotic idiocy is due, as its name suggests, to sclerosis of the brain. It may be recognized by the occurrence of spasms affecting particular groups of muscles, which sometimes pass into general convulsions. The sclerosis may be either diffuse or tuberose and it may lead either to atrophy or hypertrophy of the cerebrum. The frontal and occipital lobes are usually affected more than other parts of the brain.

Syphilitic idiocy is rare. The diagnosis depends on the presence of the usual signs of congenital syphilis, such as a flat bridge to the nose, scarring at the angles of the mouth and, later, notched permanent central incisors and interstitial keratitis.

Idiocy by deprivation of the senses has already been referred to.

Morbid Anatomy.—The lesions found in the brains of idiots are too numerous for detailed description in a work of this nature.

In addition to microcephaly, hydrocephaly, cerebral hypertrophy and sclerosis mentioned above we meet with malformations of the brain, such as abnormal arrangement of the convolutions, microgyria, pseudo-porencephaly (cysts marking the site

of old hæmorrhages) local atrophies and atrophy of the cerebral hemisphere of one side with or without atrophy of the cerebellar hemisphere of the opposite side. In some rare cases there is complete absence of one or more convolutions, the arachnoid bridging over the gap while the pia mater lines a funnel-shaped opening into the lateral ventricle and becomes continuous with the ependyma (true porencephaly). In some rarer cases the corpus callosum is absent.

Prognosis.—Idiots and imbeciles can never attain the mental capacity of normal individuals ; but by suitable training many are capable of considerable improvement, sufficient in some cases to enable the patient to earn his own living. It is difficult to frame rules applicable to every case whereby it may be determined whether a child is educable or not. Each case has to be considered on its own merits. The following principles, however, may be considered fairly safe guides :

Extreme forms of idiocy in which there is complete absence of perception and instinctive attention are absolutely incurable. Little hope of improvement need be entertained of patients who suffer from convulsions from time to time or of idiots with a history of convulsions during the first two years of life. Little improvement can be expected in the ' wet and dirty ' cases. Extreme emotional reaction generally means that the child cannot be taught much. The prognosis is bad if he is unable to walk. Lastly if he does not experience the sense of hunger and the desire for food, if at meal-time he does not care whether he receives food or not when he sees it passed round to others at the table, there is not much probability of his ever being educated.

Puberty is apt to be a trying time for the imbecile ; he is liable at that time to undergo a certain amount of temporary retrogression or to develop dementia præcox.

Idiots seldom live long owing to their low power of resistance to disease. It is said that they are peculiarly liable to phthisis ; but this opinion is not universally held by those in charge of idiot establishments.

Treatment.—It is essential that idiots and imbeciles should live under very hygienic conditions. They should be warmly clad and their clothes should be cut in such a way as to conceal their deformities. When possible the habit of cleanliness should be enforced and control of the instincts be taught by means of firm but kindly discipline.

The senses require to be cultivated by appropriate means into the nature of which we cannot enter here. Co-ordination of movement may be developed by various devices, such as getting the child to stand on a ladder and hold on to one of the rungs, by simple games and gymnastic drill which may be set to music. After some years it is often possible to teach a simple trade.

In the education of these patients it is not to be desired that they should attain any degree of learning. If they can be taught to make themselves useful at a trade such as shoe-making, tailoring, gardening or, for women, laundry, sewing or housework, that is all that is required to make them happy and more or less self-supporting. For them reading and writing are extras as much as Latin and Greek to the ordinary schoolboy; but many acquire these extras and can even do a little arithmetic.

CHAPTER XVII.

MENTAL DISORDERS ASSOCIATED WITH DISEASE OF THE THYROID GLAND.

MYXŒDEMA.

MYXEDEMA is a somewhat rare disease, the essential pathological feature of which is diminution of the internal secretion of the thyroid gland. In the large majority of cases this is due to simple atrophy and sclerosis of the gland occurring in association with the menopause or as a sequel to some acute specific fever, acute rheumatism, syphilis or facial erysipelas. In other cases the thyroid is enlarged by the infiltration of a new growth, the glandular tissue proper being destroyed. Myxœdema sometimes appears as a sequel to exophthalmic goitre, the former hypertrophy of the thyroid being replaced by atrophy. The disease begins most commonly between the ages of thirty-five and fifty-five and occurs more frequently in women than in men.

The active principle of the internal secretion of the thyroid contains iodine and has been named 'thyro-iodine'. It is obtainable by boiling fresh glands in sulphuric acid (10 per cent.), filtering off the precipitate and removing fats by trituration with petroleum-ether and alcohol. The thyro-iodine is then dissolved in a solution of sodium hydrate (1 per cent.) and re-precipitated by the addition of dilute sulphuric acid. The precipitate, a brown amorphous powder, is purified by repeated washings in distilled water and then dried. In obtaining it for medicinal purposes it is found that the thyroid of the sheep gives the largest yield.

The function of this substance in the organism is either to destroy mucinoid products formed in the tissues or to prevent their formation. Horsley concluded from his experiments that it transformed mucinoid products into substances which were of

some service to the organism, but he has not told us what these substances are.

Physical Signs.—The appearance of the patient is very characteristic. The subcutaneous tissues all over the body are swollen, the aspect being that of general œdema ; but the tissues do not pit on pressure nor is there any exudation of serum on puncturing the skin. The face is swollen, especially the eyelids, so that the palpebral fissure is narrowed and there is in some cases over-action of the frontales similar to that seen in association with paralytic ptosis. This swelling of the face not only hampers the movements of the facial muscles, it also obliterates all the lines of expression. With the exception of a characteristic flush over the malar eminences the complexion is sallow.

The secretion of sweat being diminished, the skin is dry and rough ; the hair is dry, loses its lustre and is apt to fall out ; the nails are longitudinally striated and liable to split.

Owing to swelling of the tongue the patient has difficulty of articulation and of deglutition and owing to swelling of the vocal cords the voice is low-pitched and raucous. Myxœdematous patients are always constipated.

The pulse is feeble, irregular and of low tension. Examination of the blood reveals a diminution of the red corpuscles and an increase of the white. Epistaxis is common and difficult to arrest, menstruation is excessive and, in the case of childbirth, post-partum hæmorrhage is to be feared. Similarly the hæmorrhage from small wounds such as that left by the extraction of a tooth is often troublesome. The temperature is subnormal. The excretion of urea is always diminished and albuminuria occurs in many cases.

The patients are torpid and disinclined to occupy themselves or to move about from place to place. The tendon reflexes are diminished, but there are no other physical signs of disease of the nervous system.

Mental Symptoms.—Patients suffering from myxœdema usually feel cold ; they complain especially of a subjective feeling of coldness internally. Buzzing in the ears is also a common complaint.

On examination we find that there is no loss of any form of sensation. It has been stated by some observers that there is delay in the transmission of tactile sensations, but it is probably more correct to say that there is delay in the motor response to a tactile stimulus.

The faculty of perception is somewhat deficient owing to defect of attention and the patients have difficulty in grasping the meaning of simple sentences, written or spoken. Memory-images (ideation) are not easily called up and the association of ideas (train of thought) is impeded. The memory for remote events is good, but that for recent events is impaired because the attention to passing events is insufficient to allow them to make a lasting impression (anterograde amnesia).

Emotional reaction being deficient, the patients are apathetic and torpid. Activity of all kinds is diminished and slow. There is little or no instinctive desire to be up and doing. As a rule they are disinclined to talk, but this is not invariably the case. Volitional and automatic actions are as few as possible. The patients will get up and dress in the morning, but they take hours to do so. They eat their meals, keep themselves fairly clean and tidy and perform all the necessary daily functions ; but slowness in performance is characteristic of them all.

Morbid Anatomy and Psychopathology.—The condition of the thyroid has already been considered. The connective-tissue throughout the body is infiltrated with a jelly-like substance to such an extent as to cause compression of the parenchyma of the various organs and to interfere with their function. No changes have, however, been discovered in the central nervous system.

From a psychological standpoint myxœdema is a very interesting disease in that the psychical disabilities of the patient can all be explained by the mechanical interference of the motor functions. The muscle fibres being compressed by the mucinoid substance, volitional and instinctive movements are all rendered difficult of performance. By the same mechanism the muscular, glandular and even vasomotor changes constituting emotional reaction are impeded so that the patient does not experience emotion. Similarly there is an impediment to that muscular adjustment of the organism to facilitate the reception of sensory impressions, which we call attention ; and the difficulty of perception, retardation of the association of ideas and inability to retain new impressions may all be traced to this defect of attention.

Although no histological changes in the nervous system have as yet been described in association with myxœdema and although the mental symptoms are all referable to mechanical

interference with the musculature, it is not to be supposed that the central nervous system is unaffected by the toxin which presumably circulates in the blood owing to the absence of the neutralizing influence of the internal secretion of the thyroid. On the contrary the mere fact that the natural termination of the disease is coma is antagonistic to such a view.

The above remarks apply to the psychical symptoms characteristic of myxœdema and not to other forms of psychosis which sometimes complicate the disease. In the latter conditions there will be found in the central nervous system the usual changes associated with the particular psychosis.

Course and Prognosis.—In the absence of treatment myxœdema is a progressive disorder, terminating fatally. The power of resistance of the tissues to infection is lowered, so that many of the patients die of some intercurrent disease, especially tuberculosis. If, however, the disease runs its course and death is directly due to myxœdema, extreme physical weakness sets in towards the end, the body shrinks and wastes and the patient dies comatose. It is remarkable in such cases that the mucinoid substance is not to be discovered in the tissues after death.

Treatment.—This consists in the administration of thyro-iodine. It is usually given in the form of the dried thyroid gland of the sheep. It is necessary to start with small doses (the equivalent of 2 to 3 grains of the fresh glands daily) and to work up gradually to larger quantities. The patient should keep his bed during the first few weeks of treatment. Indications that he is receiving too large a dose of thyro-iodine are tremor of the fingers, rise of temperature and acceleration of the pulse-rate.

Even when all the symptoms of myxœdema have disappeared the patient must continue to take the drug regularly for the rest of his life in order to avoid recurrence of the disease.

CRETINISM.

This is a state of defective mental and physical development, due to congenital deficiency or absence of the thyroid body.

Etiology.—The disease is endemic in certain mountainous districts on the Continent; in this country it occurs only

sporadically. Where it is endemic the drinking-water is usually held responsible, probably with reason, for the disease has been stamped out in one or two villages by inducing the inhabitants to substitute rain-water for drinking purposes. Analysis of the spring-water of cretinogenous districts has shown that it usually contains chalk, sulphide of iron and sulphate of magnesium.

FIG. 73.—M. B., ÆT. 16 YEARS. SPORADIC CASE OF CRETINISM FROM BERKSHIRE.

The cause of sporadic cretinism remains to be discovered. The disease is slightly more frequent in girls than in boys.

Physical Signs.—The first signs of cretinism are seldom observed before the sixth month, sometimes not until the child has attained the age of two years, or even later. It is then noticed that growth is retarded or irregular, the body not keeping pace with the head, that the voice is hoarse, low-pitched and unnatural, the skin harsh and dry, and the abdomen unduly prominent.

Examination of the thyroid region reveals either absence of the gland or the presence of a small goitre.

If the disease be left untreated the body remains stunted in growth and the infantile condition persists, so that a cretin of twenty years of age may look like a child of four. The cretin differs, however, from a normal infant in presenting many deformities.

The head is too large for the body and the spinal muscles are too weak to hold it up, so that the chin is liable to sink on the chest. As a result the shoulders become rounded and there is compensatory lordosis in the lumbar region, which is enhanced by the swollen belly. The limbs are short and the tibiæ may curve outwards as in rickets.

The head is elongated and, especially in the occipital region, broad. On the top it is flat. There is undue separation between the eyes.

The integuments are swollen and look œdematous; but, as in myxœdema, they do not pit on pressure nor is there any exudation of serum when the skin is punctured. The face and nose are broad and puffy, the lips thick and the eyelids swollen. These features taken in conjunction with the swollen abdomen and the podgy limbs give the child a very characteristic appearance.

The swelling also affects the mucous membranes. The tongue is swollen, often projecting between the incisor teeth; and there is swelling of the soft palate and laryngeal tissues as in myxœdema.

Soft lobulated lipomata, each about the size of a hen's egg, are to be felt in the supra-clavicular regions and less frequently in the axillæ.

The temperature is subnormal and the pulse-rate slightly increased. Examination of the blood reveals the presence of nucleated red corpuscles, increased size and diminished number of the ordinary red corpuscles and diminution of hæmoglobin.

Dentition is late and the teeth are very liable to become carious. The sexual apparatus and the genital functions develop late or not at all.

Mental Symptoms.—Intellectual deficiency which in many cases amounts to an extreme form of idiocy is characteristic of this condition.

Three grades are recognized:

1. *Cretins* in whom mental activity is at the very lowest ebb, who are in a perpetual state of somnolence, who utter no articulate sounds and whose sole evidence of mentation is the emission of strident cries of satisfaction or dissent when food is given or not given to them;

2. *Semi-cretins* who are able to walk a few paces slowly and with difficulty, to speak a few words and to learn how to perform a few simple acts; and

3. *Cretinoids* whose mental development is less retarded than that of the semi-cretins; they are to be regarded as imbeciles rather than idiots.

The mental condition associated with cretinism differs little from other forms of idiocy and imbecility. The cretin is perhaps of a gentler disposition; he possesses fewer criminal instincts and his movements are slower than those of other feeble-minded children.

Morbid Anatomy and Pathology.—As in myxœdema all the tissues are infiltrated with mucinoid products and the thyroid is absent, diminutive or goitrous. The shape of the skull has been ascribed by Virchow to premature synostosis between the basilar portions of the sphenoid and occipital bones. The sella turcica is small, the clivus steep and the foramen magnum smaller than natural.

Macroscopically the nervous system appears to be fairly normal. Under the microscope the cortical nerve-cells are seen to be slightly smaller than the normal and they tend to be globose as in other forms of idiocy.

Prognosis.—In cases of pure cretinism, not cretinism plus genetous idiocy, the prognosis is favourable if treatment is begun early, before the child is three years of age. Physical improvement can be accomplished at any time of life by the administration of thyroid, but the longer treatment is delayed the smaller is the amount of intellectual improvement to be expected.

Treatment.—The patient should be removed to a healthy neighbourhood or at least to a district where the drinking water is pure and iron-free. Dried thyroid should be administered as in myxœdema. The equivalent of not more than 10 grains of the fresh gland per week may be given at first and this dose may be gradually increased until at the end of six months the patient is taking the equivalent of 10 or 15 grains daily. This latter dose must be continued during the

remainder of the patient's life if relapse is to be avoided. Under this régime the patient grows rapidly (about 4 inches a year at first), the swelling of the integuments and the supraclavicular lipomata disappear, the skin tightens and gets soft and supple, the temperature rises to normal, the blood becomes normal and the child active and intelligent. During the rapid growth the legs are liable to become bowed, owing to the cartilage of the long bones growing faster than the ossifying portions. To prevent this deformity it may be desirable that some form of apparatus be worn for the purpose of giving lateral support to the legs until the greater part of the epiphyseal cartilages has become ossified.

EXOPHTHALMIC GOITRE.

This disease in its fully developed form is characterized by enlargement of the thyroid, protrusion of the eyes, tachycardia, palpitation, tremor and mental symptoms.

Etiology.—Although exophthalmic goitre is often regarded as the result of excessive secretion of the thyroid gland its etiological relationships rather suggest that it is primarily a neurosis. It is four times as frequent in females as in males and it occurs usually between the ages of sixteen and forty. It is rare before ten and after fifty; but Dreschfeld has reported one case at the age of three and Divel has put on record another occurring as early as two and a half years of age. Not uncommonly it occurs in several members of the same family and in such cases it is usually found that one or other of the parents is neurotic or comes of a neurotic stock. The disease sometimes arises as a sequel to influenza; but far more frequently the exciting cause is found to be some mental shock such as fright, worry, grief or excessive mental application. Pregnancy is sometimes the cause; but on the other hand the symptoms are often ameliorated by the occurrence of pregnancy. The disease may be associated with hysteria, epilepsy, chorea and, as we shall see later, insanity.

Physical Signs.—The enlargement of the thyroid is as a rule moderate and does not in itself greatly inconvenience the patient. In some cases, however, it exerts some pressure on the trachea and gives rise to cough and even dyspnœa. It is usually pulsatile; a thrill is sometimes to be felt in it and a hæmic hum heard with the stethoscope.

The eyelids are retracted, the palpebral fissure is widened and the eyes protrude. All this gives the patient a staring aspect. If, without moving the head, he transfers his gaze from the ceiling to the floor, the upper lid lags behind so that a portion of the sclerotic above the cornea becomes visible. Nictitation is diminished in frequency. Convergence is weak and in severe cases of exophthalmos there may be weakness of the external recti so that double vision results on extreme lateral deviation of the eyes.

The frequency of the pulse is greatly increased. A pulse-rate of 120 per minute is common and this is easily raised to 140 by slight exertion or emotional disturbance; even 160 is not rare. Palpitation is a fairly constant symptom. Low blood-pressure is the rule and probably accounts for those cases in which the patient feels the pulse all over the body.

There is fine tremor of the limbs and trunk. It is best seen in the fingers and especially when a good many muscles are put into action, as when the patient stands, holds out her hands and separates the fingers.

The patients are always thin and in severe cases extremely emaciated. They are weak and easily become fatigued on exertion, either mental or physical.

The appetite is usually excessive. Often it is capricious, the patient desiring to eat out-of-the-way, indigestible forms of food such as lobsters, pickles and nuts. The saliva is scanty and viscid and there is insatiable thirst. In some cases, on the other hand there is loss of appetite.

Diarrhœa and vomiting are common symptoms. These may occur either together or independently of one another. Dreschfeld has shown that the vomiting of exophthalmic goitre is associated with acetonæmia, acetonuria and air-hunger, such as we see in diabetes. As a rule the urine is otherwise normal.

The patients always feel hot and they wear a minimum amount of clothing even in winter. The secretion of sweat is increased and the moisture of the skin thus caused diminishes its electrical resistance, so that the muscles respond more readily to electrical stimulation than in the normal individual. The knee-jerks are brisk.

A good many 'incomplete' cases occur in which not all the above symptoms are present. A diagnosis of exophthalmic

goitre will in all probability be correct if any two of the four cardinal symptoms (thyroid enlargement, exophthalmos, tachycardia and palpitation) coexist.

Mental Symptoms.—It has been pointed out by certain writers that the above series of physical signs of exophthalmic goitre is exactly the same as occurs in a normal person experiencing the emotion of fear. This is the keynote to the mental symptoms of the disease.

A short period of irritability and restlessness usually precedes the development of the physical signs and when these become pronounced the patients are in a constant state of dread. As every experienced hospital nurse is aware, any unusual incident occurring in the ward, however trivial, even the placing of screens round another patient's bed, serves as a *point d'appui* for alarm. When they receive a letter they fear that it may contain bad news. Sometimes they are afraid that in telling the truth they may bring some harm upon themselves or their family, and they become untruthful. In other cases this fear leads to a suspicious habit of thought. Their sleep is disturbed and they are liable to wake up in a fright.

Sensation, perception and ideation are as a rule unaffected; but hallucinations, usually visual, occur in a few cases. The train of thought, judgment and reasoning are all normal and the memory is good. The attention is apt to wander. The patients are usually rather wilful; but their general conduct, except in so far as it is influenced by the prevailing emotional tone, may be regarded as normal.

These characteristic mental symptoms are of course only to be expected in cases where the physical signs are well marked. The mentation of 'incomplete' cases cannot as a rule be said to differ from the normal.

The above description refers to the ordinary mental state of a patient suffering from exophthalmic goitre; but it has been long recognized that other psychoses are especially liable to arise in the course of this disease.

Episodic Mental Disorders.—It is not surprising to find that morbid fears and associated impulses are common among the episodic mental disorders occurring in the course of exophthalmic goitre. They differ from the obsessions described in the chapter on psychasthenia in that [illegible]. There is no persistent agoraph[illegible]

character in the course of time, for example, to acrophobia, fear of knives and so forth.

Mania and melancholia are also liable to complicate exophthalmic goitre, the former being the more frequent, perhaps on account of the diminished blood-pressure. Both states tend to terminate in secondary delusional insanity, the patient developing delusions of persecution.

Morbid Anatomy and Pathology.—No changes of importance, such as might throw light on the physical basis of the mental disorders, have been discovered in the central nervous system. Dr. W. S. Greenfield has described changes in the sympathetic ganglia of the neck, but these are not regarded as peculiar to exophthalmic goitre.

The thyroid is enlarged and unduly soft and it may contain small cysts of colloid material. Microscopically it is found that the secreting membrane lining the alveoli is hypertrophied, thrown into folds and consists of columnar instead of cubical cells. In conformity with this change the contents of the alveoli contain mucin as well as colloid material.

The thymus gland is persistent and enlarged, but normal in structure.

Whether all the symptoms are to be explained by over-activity of the thyroid gland and consequent excessive production of its internal secretion is not definitely known. The disease cannot be produced in most people by the ingestion of large doses of the dried gland; but Boinet has recorded a case in which the disease was caused in this way on two separate occasions and was accompanied by mental symptoms (*Rev. Neurolog.*, 1899). It is not stated and is probably not known whether the thymus was persistent in this patient.

Many of the symptoms, but not all, can be explained on the supposition that there is excitation of the sympathetic system.

Prognosis.—Exophthalmic goitre has so many possibilities that we have to be extremely guarded in our prognosis. Its duration may be anything from a few days to twenty years or more. On the whole the tendency is towards recovery, but about 25 per cent. of the cases terminate fatally. The prognosis as regards both recovery and the expectation of life is rather more grave when episodic mental disorder supervenes. Of forty-three such cases collected by Hirschl six recovered from the

mental disorder. Some cases terminate in myxœdema, even after so short a period as two years.

Treatment.—Almost every form of treatment has been tried for exophthalmic goitre; each has had its successes and failures. Of late the serum of goats which have had their thyroid gland removed has been successfully employed (antithyroidin or serum Mœbius).

The patient should live in good hygienic surroundings, preferably in the country. Mountain air is said to do good in some cases. A liberal, plain, nutritious diet should be allowed. It may be augmented by milk and cream and supplemented by the administration of cod-liver oil and extract of malt. Belladonna proves to be the most serviceable sedative. Complications are to be treated on general medical principles.

It must not be forgotten that these patients are easily fatigued and that exercise is to be discouraged. Rest in bed is to be enjoined during acute exacerbations of the disease.

CHAPTER XVIII.

MENTAL DISORDER ASSOCIATED WITH VARIOUS OTHER NEUROSES.

CHOREA.

THE characteristic feature of chorea is the occurrence of involuntary, irregular, sudden and somewhat jerky movements, muscular weakness and inco-ordination of voluntary movement. A detailed account of so common a disease would be out of place in a work of this nature; we therefore proceed at once to the consideration of the

Mental Symptoms.—Most observers are agreed that cutaneous sensation is unaffected in uncomplicated chorea. Similarly hearing, vision, taste and smell are normal.

The only disorder of perception is the somewhat rare occurrence of hallucinations, usually of vision, rarely of other sense-modalities.

Difficulty of ideation (the revival of memory-images) is one of the most striking symptoms. If, for example, a choreic patient be asked to name all the animals he knows of, he frequently cannot mention more than three and I have known one unable to remember any other animal than a horse. Another, a girl of twelve, whom I asked to enumerate all the birds she could remember, could get no farther than a robin, cock-robin and robin redbreast. On the other hand, associative memory is fairly good for remote events, but it may be defective for recent events. Association of ideas is apt to be of the scatter-brained variety.

All these disorders of ideation are due to lack of attention. The spontaneous involuntary movements and defective co-ordination render the attitude of attention impossible; the organism cannot be favourably adjusted for the reception or revival of sensory impressions. For the same reason the child is unable to learn lessons.

The emotional tone is variable, being mostly determined by the attitude into which the patient is thrown by the choreic movements; he is by turns angry, fearful, fretful, capricious and irritable.

Movement being entirely uncontrolled and dominated only by the caprice of the disease, volition is defective in severe cases.

Various *forms of insanity* may arise episodically during the course of chorea. In such cases the choreic movements rapidly cease and become replaced by those characteristic of the particular form of mental disorder which is present. In view of the frequency of chorea, the rarity of its occurrence as an antecedent of certifiable mental disorder and the variable nature of the insanity which occurs as a sequel to chorea, no direct relationship can be acknowledged to exist between chorea and insanity. Excluding cases of Korssakow's disease induced by arsenical treatment the author has seen cases of mania, melancholia, exhaustion psychosis and dementia præcox (katatoniac stupor) following directly on acute chorea, four cases out of several thousand.

Huntington's Chorea.

This rare disease, which has probably no relationship to the form above described, is a chronic incurable chorea which begins usually between thirty and forty years of age and is apt to occur in several members of the same family.

The movements are slower than those of Sydenham's chorea. They affect the face, causing grimaces; the tongue, causing difficulty of articulation; the hands, interfering with the patient's writing; and the lower limbs, causing an occasional drunken-looking lurch in his gait.

Mental Symptoms invariably occur in association with this disease. At first the patients are irritable; later, depression of the melancholiac type dominates the clinical picture. As the disease progresses the capability of reviving memory-images is lost, as in Sydenham's chorea; associative memory then becomes impaired and ultimately lost. Dr. Farquhar Buzzard's patient whom I had the advantage of examining at a clinical meeting of the Neurological Society had well-marked imperception. He was unable to name at sight fairly common objects and he could not apprehend the meaning of other than simple sentences

(agnosia). Agnostic apraxia, of course, was present and I thought that there was, in addition, some motor apraxia.

All the intellectual faculties undergo progressive deterioration and the patient, after twenty or thirty years, becomes reduced to a condition resembling the terminal stage of general paralysis. Some authors, including Kraepelin and Binzwanger, have even gone so far as to regard Huntington's chorea as a form of general paralysis. This view receives some degree of support from the post-mortem appearance of the brain, chronic lepto-meningitis being present with adhesion of the pia mater to the cortex; but the absence of spider-cells and plasma-cells as well as the hereditary nature and invariably chronic course of the disease indicate an essential difference between the two disorders.

Paralysis Agitans.

The special interest attached to this disease lies in its resemblance to melancholia. In both there is a general attitude of flexion, in both there is proximal rigidity and in both there is a tendency to over-action of the muscles controlling movements at the small joints.

In the chapter on melancholia the author has shown how misery is the result of this attitude. Similarly in paralysis agitans this attitude of misery induces a feeling of depression, at least in the later stages of the disease when the physical signs are well marked. There is often a vague sense of impending harm, sometimes amounting to suspicion. I have known a hospital patient become greatly agitated whenever there was a change of house-physicians, knowing full well that some new drug would be tried on him, and fearing the worst.

Like many melancholiacs these patients always feel warm and do not like to be near the fire. There is no loss of sensation.

Perception is liable to be impaired in long-standing cases and hallucinations of hearing sometimes occur. There is retardation of the train of thought and recent memory is sometimes impaired in the later stages of the disease. The patients occasionally threaten suicide, but I have never heard of this threat being carried out.

It is probable that the characteristic attitude, rigidity and paresis occurring in paralysis agitans are, as in melancholia, dependent upon the accumulation of paralysing products within

the cortical neurons. On the other hand the difference between the small joint movements of melancholia and those of paralysis agitans suggests a difference between their physical bases. The volitional aspect of the picking movements of melancholia, as we have already seen, indicates cortical irritation. The coarse involuntary tremor of paralysis agitans is suggestive of irritation on some lower level of the nervous system, possibly the mesencephalon. Dana and Redlich have described sclerotic patches round the vessels of the spinal cord.

Treatment.—Probably every sedative under the sun has been tried for relieving the distress of paralysis agitans. Of these, I have found trional, cannabis indica and hyoscyamus the most useful.

The Tics.

As the term ' tic ' has until recently been and is still in some quarters used somewhat loosely in this country so as to include not only ' habit spasm ' and ' habit chorea ', but also such conditions as muscular spasm arising as a reflex effect of pain (so-called ' tic douloureux ') or as a direct result from peripheral nerve irritation, a definition of tic becomes a necessary preliminary to any remarks on this subject.

The following definition which includes the pathogeny of the condition so clearly and concisely that it can scarcely be improved is quoted from Dr. S. A. K. Wilson's ' Tics and their Treatment ', a translation of a very illuminating French work by Meige and Feindel :

' A tic is a co-ordinated purposive act provoked in the first instance by some external cause or by an idea ; repetition leads to its becoming habitual and finally to its involuntary reproduction without cause and for no purpose, at the same time as its form, intensity and frequency are exaggerated ; it thus assumes the characters of a convulsive movement, inopportune and excessive ; its execution is often preceded by an irresistible impulse, its suppression associated with malaise. The effect of distraction or of volitional effort is to diminish its activity ; in sleep it disappears. It occurs in predisposed individuals, who usually show other indications of mental instability '.

To elucidate by a few examples : Torticollis is usually a tic. We have all met people who grunt, sniff or spasmodically blink their eyelids during ordinary conversation ; tooth-grinding in

general paralysis and trismus in some other cases of insanity are examples of tic. There are tics of the arm, shoulder and leg; most of these are popularly known as 'tricks'.

There is an obvious analogy between tics and obsessions. As in obsessions, so in tics, we note incessant recurrence, useless resistance and, during their development, struggle and anguish while the effort at resistance is being made and a sense of relief when the struggle is over and the tic has won the day. In the fully-developed tic, however, incessant recurrence is the only element which it has in common with the obsession; the tic movement is all over before any attempt at resistance can be made. It remains to be insisted that some muscular contraction is the essential feature of a tic; an imperative idea is not a tic nor is a morbid fear or irrepressible impulse. All these are doubtless apt to induce tics of various kinds; but they are not entitled to the name until the movement-idea has sunk into the background. We cannot therefore admit such expressions as 'psychical tic' and 'mental tic' used by some authors as synonymous with obsession. An obsession is an obsession and a tic is a tic.

The author has been particularly impressed in neurological practice with the special liability of patients afflicted with torticollis (especially females) to develop mental disease and in asylum practice with the unusual number of cases of torticollis (about 1 per 1,000, all females) as compared with those in the general population. We are therefore called upon to consider the characteristic mental condition of tic subjects, sane and insane.

On examination of those patients who have not been so unfortunate as to develop definite mental disease, we find that sensation, perception, ideation, the association of ideas and memory are all normal. The reasoning power is good, and many show signs of remarkable intellectual ability. Characteristic deficiencies are to be noted in the patients' conduct. They are often incapable of sustained attention. They may lack control of their latest acquired instincts and hence acquire a reputation for immorality. In other cases the latest instincts do not develop; and in spite of considerable intelligence their instincts, desires and therefore behaviour, are those of a child (mental infantilism). Meige and Feindel quote the case of a lad, nineteen years old, 71 inches high, intelligent, and educated, who

had to be fed, dressed and put to bed by his mother. The patients are emotional; they laugh and weep at trifles or they show signs of impatience or irritability for the most trivial reasons.

Enough has been said to indicate to the student the physical basis underlying all these mental peculiarities. The deficiency lies obviously in the motor systems. The volitional motor system is always affected most; lack of voluntary attention and loss of control of the emotions and more lately acquired instincts are present in all cases, to say nothing of the loss of control of those particular movements which constitute the patients' tics. In other words the instinctive cortico-rubral system is incompletely developed and the patient remains, so far as his instincts are concerned, a child.

When definite *mental disease* supervenes in these cases, it appears to fall into line with the exhaustion psychoses, so far as the author can ascertain from a limited experience (six cases).

Some patients show typical exhaustion symptoms from the first; but the disease usually appears in the first instance under the guise of mania or melancholia. Hallucinations of vision are liable to appear early, hallucinations of hearing later. At this stage there is usually tendency to amelioration. In the author's series this has been but temporary. As the patient improved mentally, the tic became more aggravated and this preceded gradual relapse into a form of confusional insanity with hallucinations, imperception, disorientation in time and place, extensive peripheral anæsthesia, loss of memory and inability to recognize former acquaintances. This stage having been reached after seven or eight months of careful treatment, dementia supervened in five of the writer's cases. The sixth was that of an acute confusional state lasting one week, after which the patient recovered.

Treatment.—For the treatment of tics the student is recommended to read Dr. Wilson's book on the subject. Should mental disease arise, prolonged rest in bed must be tried, with a good nutritious diet, free from meat. The writer is of opinion that failure in the treatment of these cases may be ascribed to allowing the patients to get up too soon.

CHAPTER XIX.

MENTAL DISORDER OCCURRING IN ASSOCIATION WITH VISCERAL DISEASE.

It is almost a truism that the higher functions of the brain are liable to be perturbed whenever the functions of the menial viscera become disordered through disease. If large portions of the lung be destroyed, the brain suffers from deficient aëration of its nutrient medium, the blood; in uncompensated heart-disease the brain is affected as much as or more than other less delicate organs by the inefficient circulation of the blood; if the kidneys fail to excrete toxic products, the brain must be injured by the effects of the retained poisons. These facts have long been recognized and in a bygone age when the relationship was ill understood, mental disorder associated with visceral disease used to be called 'sympathetic insanity'. Since those days our knowledge of the relationship has been advanced by numerous investigators. We have already dealt with the delirium of fever, the post-febrile exhaustion insanities and the insanities associated with disease of the thyroid. In this chapter we have to consider the mental condition of patients suffering from phthisis, heart-disease, kidney disease and derangement of the digestive system.

The most illuminating contribution of recent years to this subject is contained in Dr. Head's Goulstonian Lectures for 1901. The observations recorded in those lectures have been neither confirmed nor refuted by any subsequent observer, but there is no reason for doubting them. Dr. Head reports the occurrence of hallucinations of vision, hearing and smell in cases of phthisis and heart-disease. Hallucinations of vision are the most frequent; they usually take the form of a figure standing at the foot of the bed and are said to be lacking in colour. The hallucinations of hearing do not take the form of

voices; they are usually knocks or taps, bells, footsteps or heavy breathing. The smell hallucinations are of decaying matter, something burning, an earthy smell or the smell of gas. The patients are also liable to attacks of depression or suspicion. It is further demonstrated that all these mental symptoms arise in association with severe or prolonged pain resulting from disease of the viscera and referred to the body-wall. In Dr. Head's series of cases the symptoms occurred in phthisis, aortic regurgitation, aneurism and dilated aorta, mitral regurgitation, combined aortic and mitral disease and in adherent pericardium. They do not occur in the absence of pain, *e.g.*, in those cases of valvular disease in which the first sound is abolished or in cases of phthisis in which destruction of lung tissue progresses so rapidly as to destroy the pulmonary nerve-ends. Nor do these mental phenomena occur in association with the pain of pleurisy, since this arises in the body-wall itself and is not a referred or reflected pain.

It is further pointed out that pain referred to the abdomen is more liable to cause mental depression than pain in any other region. Hence it is found that the pain of aortic disease, which is referred to the upper part of the chest, is less frequently associated with mental depression than that of double mitral disease which is referred to the upper abdominal areas.

Similarly with phthisis. In the early stages, when the disease is limited to the apices of the lungs, the patient is cheerful and hopeful of recovery (spes phthisica); but when the disease invades the lower lobes and the pain is referred to the abdomen, he becomes depressed and is fearful of impending harm. Later he becomes suspicious, thinks that others are talking about him and that the nurses do not like him and are inclined to neglect him. With inexperienced nurses this mental attitude is liable to lead to unfriendliness, complaints and even quarrels; but the phthisical patient's last days may be made much happier if he be treated with the tactfulness which nurses are wont to extend to patients whom they recognize to be suffering from mental disorder.

It is interesting to note that exactly the same mental symptoms occur in cases of tubercular peritonitis, but even in a more marked degree.

The depression and train of neurasthenic symptoms associated with nephroptosis are possibly to be accounted for in the same way.

Another factor having etiological relationship with these mental disorders is the blood-pressure. Dr. Craig has shown that a low blood-pressure is liable to be associated with motor restlessness. In accordance with this observation, we find that attacks of excitement are common in patients whose blood-pressure is low, especially those afflicted with aortic disease. Similarly in all cases of heart-disease, when compensation suddenly fails motor restlessness is an almost invariable concomitant. The same symptom is observed in cases of chronic renal disease when the blood-pressure suddenly falls as a result either of cardiac failure or of prolonged diarrhœa.

Uræmia.—There is an acute delirious form of uræmia in which occur many of the symptoms characteristic of acute confusional insanity of toxic origin. There are hallucinations of vision and hearing and the patient exhibits occupation delirium in which he is apparently busy at his usual work. There is difficulty of perception and it is impossible to distract the patient's attention from his hallucinations; if, however, one succeed in doing so it is found that there is difficulty of perception, with disorientation in time and place. The memory is poor. The patient is restless and agitated and is liable to localized or general convulsions.

When other forms of psychosis arise episodically during the course of chronic Bright's disease states of depression are more common than states of excitement, probably on account of the raised blood-pressure. According to Roubinovitch, Bright's disease may be suspected of having etiological relationship to the mental disorder when the following symptoms are present: hallucinatory confusion; crises of hebetude, somnolence or stupor; cataleptic phenomena occurring independently of hysteria or, we presume, of dementia præcox; and convulsions or attacks of coma.

Diabetes.—A relationship between this disease and insanity has long been recognized. It is not uncommon to find a history of mental disease among the relatives of diabetics, nor is it uncommon to find a history of diabetes among the relatives of the insane. Further, sugar may be detected in the urine of about 1 in 400 of the insane (Bethlem cases) excluding cases of true diabetes.

The author has had six cases of glycosuric insanity under his care. Five were cases of melancholia, of whom one died and

four recovered under the ordinary treatment for diabetes ; the sixth became demented. It is said that in some such patients the sugar disappears from the urine when insanity supervenes, and reappears as soon as recovery from the mental disorder is established. In the author's cases the sugar gradually disappeared under treatment, complete absence of glycosuria preceding by a considerable period restoration to mental health.

Gout.—The characteristic irritability of a gouty patient during an acute attack of his disease is well known. Some gouty patients are liable to attacks of melancholia in association with their attacks of gout. In others, attacks of gout are said to alternate with attacks of insanity.

Treatment is to be carried out on general medical principles.

CHAPTER XX.

COMBINED PSYCHOSES.

In the foregoing pages we have had under consideration the various types of mental disorder to which the majority of our cases conform. Some patients, however, present at the same time symptoms of two or more of these types. And inasmuch as the classification which we have adopted is based, so far as our present knowledge will allow, on etiological and pathological considerations we have to recognize that, in the cases with which we are now dealing, there are two or more etiological factors at work and that the patients are suffering from two or more diseases at the same time.

To take an extreme example: At the moment of writing I have under observation a man aged fifty-three who, previously to the onset of his present illness, suffered from occasional epileptic fits. While in West Africa he became infected with dysentery and had an exhausting diarrhœa for three months. The dysentery was cured at the Dreadnought Hospital, Greenwich, whence he was transferred to Bethlem. On admission he was found to have extensive anæsthesia and hallucinations of vision and hearing. The degree of his disorientation of time and place may be gathered from the fact that he thought that the year was 1815, and that he was in Melbourne, Toronto or Pernambuco. His perception was so deficient that, although he was lying in bed, he believed that he was in either a theatre or a church. He did not know his own name, could not recognize his wife and his memory was a blank. Here we have to do with a psychosis in which are present the combined results of epilepsy, intoxication and exhaustion. More recent observation has led me to the supposition that arteriosclerosis is another factor in the case.

The study of these combined psychoses is yet in its infancy

and it is impossible at the present time to give a detailed account of them; but it is hoped that the following remarks will help the student to understand these difficult cases and to avoid error in diagnosis.

Intermittent Cases.—With these the most common complications are exhaustion symptoms; so much so that in the description of the intermittent and periodic psychoses reference to such symptoms was found to be unavoidable.

It will be remembered that the cardinal symptoms of intoxication of the nervous system by the products of exhaustion and by many other poisons are anæsthesia, hallucinations, imperceptions, disorientation in time and place and loss of memory. Now when a patient suffering from mania or melancholia also presents any of the above symptoms the case cannot be regarded as uncomplicated. Cases of intermittent insanity with anæsthesia, hallucinations or both should be described as mania (or melancholia) with exhaustion symptoms. Anæsthesia and hallucinations do not occur in pure intermittent insanity, anergic and post-maniacal stupor being excepted.

When exhaustion symptoms complicate intermittent insanity the attack must be expected to last much longer than it otherwise would. Hallucinations, especially of hearing, are of grave significance in melancholia, but are of minor import in mania. Anæsthesia is not so serious a symptom as hallucination, provided it is not prolonged for more than a month after the patient comes under treatment.

Intermittent insanity appearing for the first time late in life is liable to be complicated by early symptoms of arteriopathic dementia. There may be a slight degree of imperception, loss of memory for proper names and for quite recent events, and a tendency to eroticism. Insight is apt to be deficient. The presence of arteriosclerosis does not materially affect the prognosis of mania, but melancholia is not likely to be cured when the cerebral arteries are diseased.

Exhaustion Cases and Dementia Præcox.—Acute confusional insanity is sometimes complicated by cataleptic and catatonic phenomena to such an extent as apparently to justify the diagnosis of dementia præcox. On the other hand, dementia præcox may be complicated by exhaustion symptoms. If the patient is completely disorientated I generally regard the case as being primarily one of acute confusional insanity, the catatonic and

cataleptic phenomena being secondary. Under such circumstances the prognosis is good, provided that the treatment is apt and persistent. The illness usually lasts about a year. If, on the other hand, disorientation is incomplete and especially if the patient shows a tendency to keep one hand constantly over the external genitalia I regard the case as being primarily one of dementia præcox, the prognosis being hopeless. These, of course, are mere working rules ; they are not infallible.

Alcoholic Cases.—The student must be prepared to meet with cases which, on admission, present the symptoms of an acute form of alcoholic psychosis and subsequently turn out to be examples of a chronic form, when the effects of acute intoxication have passed away. Similarly he must be prepared to meet with cases which present symptoms of alcoholic insanity on admission and subsequently turn out to be cases of intermittent insanity, dementia præcox, general paralysis, arteriopathic dementia, neurasthenia, epilepsy or some other psychosis ; the symptoms having, during the first few days, been masked by alcohol.

Neurasthenics frequently have symptoms of psychasthenia (morbid fears, etc.) and, *vice versa*, psychasthenics often suffer from neurasthenic symptoms.

Lastly it must not be forgotten that attacks of mania, melancholia, anergic stupor, collapse delirium and acute confusional insanity may and do occur from time to time among imbeciles, paranoiacs, epileptics, neurasthenics and psychasthenics. In all such cases we must expect the one psychosis to be modified by the other. It is only necessary for the student to recognize the possibility of these combinations in order to be prepared for them when they occur.

CHAPTER XXI.

SOME DISEASES TO WHICH THE INSANE ARE ESPECIALLY LIABLE.

PHTHISIS.

THE death-rate from phthisis in our large county asylums, as compared with that in the general community, is so alarming that a few years ago the Medico-Psychological Association appointed a special committee ' to make some practical suggestions for the isolation of phthisical patients in asylums '. This action of the Association was the direct outcome of a prize essay by Dr. F. G. Crookshank, ' On Phthisis Pulmonalis in Asylums ' and a paper by Dr. Eric France on ' The Necessity of Isolating the Phthisical Insane '.

Dr. Crookshank points out in his essay that, although not more than 7·5 per cent. of the insane are phthisical on admission, the *official* death-rate from phthisis among the insane, which is probably too low by one-third or one-half, is 14·6 per 1,000 of the average resident population in English asylums ; whereas the phthisis death-rate among the general population of England and Wales is 1·46 per thousand living. In other words, death from phthisis is ten times as frequent in asylums as it is among the general population.

The causes of the frequency of phthisis in asylums are not far to seek ; for it is found, on examination, that in most of our large county asylums every etiological factor is at work.

In the first place it has been pointed out by Dr. C. J. Shaw, Assistant Medical Officer to the Murthly Asylum, that the insane are, as a class, more liable to tubercular infection than the sane, their capacity of resistance to tubercle, as estimated by the opsonic index, being deficient (0·8 to 0·9). The opsonic power is especially deficient during the acute stages of mental disorder and in cases of dementia præcox and general paralysis.

Further, the respiration of depressed and demented patients, who form the majority of an asylum population, is shallow and infrequent. This characteristic is not only favourable to the development of phthisis ; it also renders early diagnosis difficult. With such patients the physical signs of phthisis may be so trifling as to lead the medical officer to the conclusion that he is dealing with an early case ; whereas it is found at the autopsy a few weeks later that the lungs are riddled with cavities. Certainly it is impossible to diagnose phthisis in such patients as early as in a sane individual.

Other potent factors in the causation of phthisis in county asylums are underfeeding and overcrowding, enforced upon medical superintendents by lay committees with excessively economical tendencies, and countenanced even by the Commissioners in Lunacy.

'Under the most favourable circumstances, the floor-space allowed by the Commissioners corresponds to only 1,800 cubic feet of air per hour for ordinary patients (instead of 3,000*), and for sick patients to only 2,376 instead of the needed 3,000 to 4,000*. On their own estimate, overcrowding existed, on January 1, 1898, in thirty-six out of the seventy-seven county and borough asylums. In these thirty-six asylums there was, on the estimated dormitory and single-room accommodation, overcrowding to the extent of 1,486 persons'. 'It is childish to assert that half a crown or less per week is enough to spend on food'. 'Surely it would be difficult to find institutions which afford such opportunities for the dissemination of phthisis germs as do our asylums. Consider a community existing under conditions that preclude, for many, adequate exercise in the open air ; spending long hours in overcrowded day-rooms and dormitories ; a community of filthy and careless habits, and already phthisical in the proportion of 15 to 25 per cent. Such a community is formed by the inmates of every county asylum' (Crookshank).

The Tuberculosis Committee point out that the occupation of hair-picking in the upholsterer's shop is a dangerous one, having regard to phthisis. Not only are sharp-pointed particles of hair-dust liable to be inhaled and to wound the lung, but the hair is itself liable to be impregnated with tubercle bacilli.

The Committee found that the death-rate from phthisis was higher in asylums built on bad and damp soil than in those built

* Parkes' standard.

on good and dry soil. They also remark on the unsatisfactory heating and ventilation of many asylums.

The **remedies** are obvious. In the first place, more cubic space must be allowed for patients. It is believed that this should not be attained by building larger estbalishments, but by more strictly limiting the number of patients in asylums not larger than those already in existence. It is further held that not more than fifty patients should sleep in the same dormitory, however large. With competent nurses properly trained the air in a dormitory can easily be changed as often as four times in an hour without undue draught. During the day every aperture by which air can gain access to the dormitory should of course be opened to its fullest extent. Similarly an intelligent attendant can change the air in the day-rooms five or six times an hour without undue draught and surely it is possible, by a little thoughtful organization, to arrange that every patient not undergoing bed treatment should have a minimum of four hours daily in the open air, weather permitting.

Patients should be restrained as much as possible from the dirty habit of spitting on the floor of the ward or on the ground of the airing-court. The Tuberculosis Committee suggested that a wide-mouthed cup with contracted neck and containing some disinfectant might be fastened to the wall by a padlocked band. Any sputum found on the floor should be immediately wiped up with a rag, and this immediately burned. Hair, coir and flock should always be disinfected before they are sent to the upholsterer's shop.

The diet ought to be more generous than at present. In view of the importance of a liberal diet, not only for the prevention of phthisis, but also for the cure of insanity, it should be impossible for any patient to complain justly that he cannot get enough food.

It is imperative that phthisis be recognized as early as possible. Whenever a patient suffers from cough or is seen to be in ill-health, his temperature must be taken regularly every night for a few weeks, his weight taken every week in order to discover whether he is losing flesh and his chest carefully examined from time to time. An excellent latter-day mode of investigation is to obtain a small pipetteful of blood and to estimate the opsonic index ; but most asylums do not afford facilities for this. As a rule, tubercle bacilli cannot be discovered in the sputum from early cases.

Lastly phthisical patients are to be isolated from the non-infected and to receive treatment. At present no sanatorium exists for the phthisical insane. No great difficulty should be experienced in making some arrangement whereby they could live entirely in the open air. By way of a beginning, beds could be placed under a shelter against a wall facing south, somewhat like a cloister. The patients might remain in bed the greater part of the day and receive an allowance of 3 or 4 pints of fresh milk in addition to their ordinary food.

For further details of the diagnosis and treatment of phthisis the reader is referred to text-books on general medicine.

Asylum Dysentery.

This disease, which was long known under the name of 'ulcerative colitis', is now considered to be identical with ordinary dysentery familiar to dwellers in the tropics and ascribed to infection by the *Bacillus dysenteriæ* of Shiga.

Outside the asylum population dysentery is a rare disease in this country. Unfortunately it is deplorably common in asylums. In 1905, 1,106 of 88,207 inmates of county and borough asylums were reported to the Commissioners as suffering from dysentery. Of these, 808 recovered and 247 died, 51 remaining under treatment at the close of the year; and this in spite of the fact that twenty-eight of the eighty-nine asylums were reported free from dysentery. There is not the slightest doubt that the true condition of affairs is very much understated by these figures. On the one hand, Dr. Mott tells us that the disease sometimes exists without giving rise to characteristic symptoms and is not discovered until the case reaches the post-mortem table; on the other hand, many superintendents are unwilling to report dysentery as a cause of death and thus proclaim their particular asylum to be insanitary when other possible causes of death can be discovered.

Etiology.—As already stated, the disease is infectious. Evidence goes to show that it is communicated to the healthy by means of the evacuations from the sick, as in typhoid. When once dysentery is introduced into an asylum, even of the most modern and hygienic type, it is extremely difficult to drive it out again. The same remark applies to individual wards and even individual beds of an institution. Still more is it applicable

to individual patients for, according to Dr. Mott's report, active lesions may be found post-mortem in the colon of a patient who has been free from all symptoms of the disease for years. Hence it is liable to be spread through the injudicious transfer of cases from one ward to another or, worse, from one asylum to another. In so far as transfers are frequently necessitated by the overcrowded state of our asylums, overcrowding is to be regarded as a contributory cause of the disease.

Perhaps the most important causes of its relative frequency in asylums are the filthy habits of many of the patients themselves, in regard to which it is unfortunate that asylum nurses do not, as a rule, receive sufficient instruction concerning the nature of infection and the mode of disinfection of contaminated articles.

As is well known, the disease is not limited to the insane, even in asylums. Experience has proved that medical officers and nurses are just as liable to infection.

Incidentally it may be mentioned that dysenteric lesions are found post-mortem twice as frequently in females as in males and that alcoholics appear to be more liable to the disease than other patients.

Symptomatology.—Asylum dysentery usually sets in with rise of temperature (101° to 103° F.) and a rigor. Within the next two days, there are colicky pains followed by persistent diarrhœa which may be accompanied by tenesmus.

On examination the abdomen is found to be moderately distended and tender, especially in the hypogastrium. The tongue may be either unduly red and dry or coated with a white or brown fur. The pulse is small and frequent.

The evacuations are loose; their odour is offensive and so characteristic that the medical officers of institutions where the disease is rife can recognize a case from the odour alone. The stools contain blood and slime to a variable extent, the slime consisting almost exclusively, according to Dr. Mott, of polymorphonuclear leucocytes and mucin, with a few decaying columnar cells.

Dr. Mott recognizes seven different clinical types of asylum dysentery:

'1. The acute case, with preliminary fever, lasting till death supervenes in about two to ten days.

'2. The acute case, with preliminary fever, and a temperature which falls rapidly as the collapse proceeds.

'3. The case with mild fever, 101° to 103° F., and diarrhœa, for a day or two, accompanied by diarrhœa with blood and slime in the stools for a few days to a week or more; terminating, however, in recovery.

'4. The mild case without fever, but with diarrhœa, accompanied with blood and slime, lasting over two days. In some of these cases there may have been initial fever, which was overlooked.

'5. Cases of varying degrees of severity in which, after an interval of a few days, symptoms recur, sometimes with fatal results and sometimes with recovery.'

'6. Cases which do not clear up after the first week or two, but which become chronic: the patients continuing at more or less intermittent intervals to pass bloody, slimy, diarrhœal evacuations for months. Such are common.

'7. Cases of intermittent or prolonged diarrhœa, in which neither blood nor slime has been noticed in the stools, and yet post-mortem dysenteric lesions of a similar nature have been found.'

Dr. Mott further draws attention to the fact that asylum dysentery may coexist with phthisis and may then be mistaken for the diarrhœa of the latter disease.

Morbid Anatomy.—The mucous and submucous coats of the large intestine are red and swollen and the mucous coat is firmly adherent to the underlying tissues, so that it cannot be moved on them. The whole colon may be the seat of all shapes and varieties of ulcer, varying in size from the most minute up to several inches in length and breadth. Primarily they are circular, but by coalescing they may acquire a serpiginous outline. Hæmorrhagic points, black or grey sloughs and healing edges may be seen here and there, according to the acuteness and intensity of the disease.

Treatment.—In the interest of the non-infected it is of prime importance that all cases of dysentery be isolated in a separate building from other patients. Clothing, bedding and utensils should be disinfected as carefully as if the patients were suffering from scarlet fever or diphtheria. The nurses must be made to understand that they are dealing with cases of an infectious disease and they should be instructed in the general principles and methods of preventing the spread of such diseases. Special care is to be taken to disinfect at least the nozzles of enema syringes used for these cases.

The treatment of patients suffering from the disease consists of disinfection of the large intestine and prevention of collapse. The former may be effected by the administration of salol or, better, β-naphthol in 10-grain doses three times a day by the mouth and by lavage of the large intestine by copious enemata of lukewarm water to which a small quantity of some non-irritating antiseptic such as creasote or lysol, may be added. If the diarrhœa be not excessive, magnesium sulphate may be regularly given by the mouth to assist in the elimination of toxic products.

For the mitigation of an exhausting diarrhœa, brandy, almost neat, should be given in 1-ounce doses by the mouth and starch-and-opium enemata administered per rectum.

The patient is of course to be kept at rest in bed and to use the bed-pan. To be orthodox the diet should be liquid and highly nutritious but non-irritating and of small bulk. These qualities are to be found in milk, given with barley-water, and good meat-essences, the latter being neither hot nor cold, but warmed to a temperature of about 90° F. But I know of a medical man who cured himself of dysentery of four years' standing by taking porridge every morning and returning to an ordinary diet.

Cutaneous Affections.

It is a matter of common observation that the skin of most patients suffering from mental disease is unhealthy and sallow. In many cases it emits an unpleasant characteristic odour which I believe to be of bad prognostic significance; and there are certain cutaneous disorders which occur more frequently among the insane than among the sane. This association between cutaneous and nervous diseases might very well be expected in view of the common origin of the cutaneous and nervous systems from the epiblastic layer of the embryo and in view of our experience that those drugs which have medicinal or toxic influence on the skin are to a large extent identical with those which have a similar influence on the nervous system.

The insane are, of course, liable to the same skin affections as other people. There are also certain of these affections to which they are especially subject. These are seborrhœa and acne, erythrasma, hypertrichosis, anomalies of pigmentation, so-called 'insane fingers' and adenoma sebaceum.

Seborrhœa is common enough among the sane, but it is relatively more frequent and more severe among the insane. Most commonly it affects the scalp where it causes dandruff and thinning of the hair. The disease seldom goes farther than this and rarely gives rise to inflammation of the scalp (seborrhœic dermatitis or eczema capitis). There is no danger in the disease, except to the patient's personal appearance, but it is desirable that the senior members of the nursing staff should be instructed as to its nature; otherwise they may blame their juniors for the dirty condition of a patient's head, whereas no amount of brushing *per se* will get rid of dandruff.

Next to the scalp the most common site for seborrhœa is just above the alæ nasi where little pellets of sebum may often be seen to have accumulated on insane patients.

Acne vulgaris, which is really the same disease as seborrhœa, affecting the face, chest and back, is extremely common among insane adolescents. It is too well known to require description in a book of this nature.

Treatment.—In the treatment of these conditions, it is essential to begin with the scalp. When the hair is full of dandruff it is useless to attempt to cure acne. Seborrhœa may be cured as follows: Wash the head nightly with soap-spirit (soft-soap 2 parts, rectified spirit 1 part), wash all the soap out of the hair with plenty of clean water, then apply to the *scalp* (the hair will take care of itself), with a piece of sponge, a strong solution of perchloride of mercury (1 in 250). This is not too strong for most cases: the scalp will quite commonly tolerate a 1 per cent. solution. If the sebum be collected in crusts on the scalp or if there be any dermatitis, it is better to use the following ointment:

Precipitated sulphur	} of each 10 grains.
Salicylic acid	
Resorcin	
Vaseline	1 ounce.

This ointment is useful also in treating seborrhœa above the alæ nasi, after the pellets of sebum have been scraped away with the finger-nail.

Erythrasma.—This is a disease of little importance, apparently allied to pityriasis versicolor. I have never seen it in the sane, among whom it is said to be very rare; but I have seen at least a dozen cases among the insane among whom it sometimes

occurs in mildly epidemic form in asylums. Erythrasma usually makes its appearance in the neighbourhood of the genitalia in the form of reddish-brown spots which spread peripherally and clear up *pari passu* in the centre, thus forming reddish-brown rings. These rings coalesce and give the rash a marginate or circinate appearance ; indeed, the disease has been called by some authors ' eczema marginatum '.

Treatment.—Erythrasma is due to a fungus, the *Microsporon minutissimum*, of feeble vitality. It is therefore easily cured by a few vigorous applications of a solution of perchloride of mercury (1 in 1,000) or of hyposulphite of soda (1 in 8), the skin being previously washed with plenty of soap and warm water.

Hypertrichosis.—Reference has already been made to this condition in the chapter on the physical stigmata of degeneration. Many women suffering from mental disorder, especially of the more chronic varieties, develop bristly hair about the face. In some cases the growth is sufficiently profuse to attain the dignity of a beard and moustache. This is a very real affliction to a sensitive woman and her comfort will be greatly promoted if it is removed. It is not generally known that this can easily be done without the use of a razor, by dissolving the hair in a solution of sulphide of barium or calcium. The best way of doing this is to make a paste, with water, of equal parts of oxide of zinc, starch, sulphide of barium and sulphide of calcium. This is spread over the affected part, left for ten minutes and then washed off, the dissolved hair coming with it. The paste should always be freshly made. The slight irritation caused by it may be relieved by the application of a little powder.

Pigmentary Disturbances.—Vitiligo or leucoderma (piebald skin) has already been mentioned as one of the stigmata. Other anomalies of pigmentation sometimes occur, apparently as a concomitant of mental disorder. On several occasions I have thought that the complexion of a patient has become much darker during twelve months' residence at Bethlem, but it is difficult to be sure ; it is no easy matter to recall the former colouring of a patient whom one has seen almost daily for twelve months on end. None of the patients in whom I have suspected this change of complexion recovered from the mental disorder. Dr. Hyslop has recently reminded us of the case, recorded by Laycock, of ' a woman who, during the French Revolution, incurred the anger of the Parisian mob and with difficulty

escaped being hanged in the streets. Her terror caused a gradual black discoloration of the whole body, and this remained with her until her death, thirty-five years afterwards.'

The name **insane fingers** has been applied to a low form of whitlow to which the insane, especially general paralytics, are liable. The condition appears to be less common than formerly, probably on account of improved hygienic surroundings and greater cleanliness on the part of the attendants.

Pellagra and Pseudo-pellagra.—Pellagra is a disease unknown in this country. It occurs in Northern Italy and other countries in that region and its incidence has been definitely traced to eating bread made from diseased maize. The disease affects the skin, nervous system and intestinal tract. The skin affection shows itself during the hot months of the year, when those parts exposed to the rays of the sun (face, arms, and sometimes feet) become first congested, then pigmented and thickened. Desquamation takes place during the later months. These processes occur for four or five successive years; ultimately the skin becomes dry, wrinkled and atrophied.

At the same time, cerebral degeneration takes place in many of the patients. They suffer from attacks of mental depression or, less commonly, excitement or stupor. There is also degeneration of the lateral and postero-median columns of the spinal cord, giving rise to the clinical picture of postero-lateral sclerosis. Certain associated gastric disturbances have been ascertained by Agostini to be due to hypopepsia. In fully-developed cases the disease is almost invariably fatal.

Cases of mental disorder in which the skin undergoes changes somewhat analogous to those of pellagra occur sporadically among patients who have never been exposed to the evil influences of diseased maize. To this condition Roussel gave the name of **Pseudo-pellagra.** He found the condition in association with the alcoholic polyneuritic psychosis, general paralysis and secondary dementia. In the few cases of pseudo-pellagra occurring within the author's experience the mental disorder proved intractable.

Adenoma Sebaceum.—Patients suffering from this disorder are almost invariably of feeble intellect and the majority are to be found in institutions for imbeciles. The patients are usually subject to epileptic fits. We should also gather from a paper by Dr. Sherlock, now Superintendent of the Belmont

Asylum, that the condition is usually, if not always, associated with patches of tuberose sclerosis in the cerebral cortex and basal nuclei and with adenomatous growths in the kidney which give rise to no clinical symptoms during life. With remarkable economy of consonants, Dr. Sherlock has named this disease or symptom-complex 'anoia'.

Adenoma sebaceum is limited to the face and occurs mostly on the nose, cheeks and chin. It consists of yellowish-white waxy-looking papules which are usually not larger than a mustard-seed and are covered and surrounded by small teleangiectases, giving the face a mottled appearance.

CHAPTER XXII.

GENERAL TREATMENT.

WHEN a person becomes insane and it is decided to take care of him and, if possible, to cure him, the first thing to be determined is the place where he is to be taken care of and treated. Except in the case of old people to whom the sudden change from home to institution life is likely to prove irksome and detrimental, there is not the slightest doubt that mental patients are best off in an institution especially built or adapted for their requirements, under the care of skilled nurses especially trained in the management of the insane and under the supervision of medical men who have had a large experience of diseases accompanied by mental symptoms, and have made them their special study. Owing, however, to the way in which an ignorant public regards a person who has once been under care in an asylum as somewhat of the nature of a freak, and stigmatizes him with such kakophemisms, if I may coin a word, as 'madman' and 'lunatic', the friends of the patient are often anxious that the treatment should, if possible, be carried out in a private house. The possibility of this course depends partly on the nature of the disease and partly on the funds available for the purpose, treatment in a private house being an expensive procedure. Symptoms which render asylum care imperative in 99 per cent. of cases are homicidal and extremely suicidal tendencies, great excitement with noisiness, persistent refusal of food, and dirty habits.

When it is decided to carry out the treatment in a private house it is necessary to engage at least two nurses and sometimes, according to the nature of the case, four or even six, who should of course be selected on account of their having had abundant previous experience of mental disorder, will consequently make due allowance for the patient's symptoms and will not treat them

as inexperienced people do, as if they were the outcome of innate wickedness.

A suite of rooms, preferably on the ground-floor, should be set apart for the patient and his nurses and adapted so as to minimize the risks attendant on the home treatment of mental disorder. The nurses should have charge of the keys, stops should be placed in the frames of the windows, the bolt removed from the door of the water-closet, and such ornaments and projections as the patient might use for self-injury be as far as possible removed. These precautions having been carried out, the treatment is otherwise much the same as in institutions for the insane.

Contraband of Lunacy.—All sharp-pointed and cutting instruments such as knives, razors and scissors must be locked up and all keys taken away. Chess is too severe a game for a person whose brain requires rest, and I recommend that sets of chessmen be forbidden to any person suffering from acute mental disorder. Experience teaches that Bibles and Prayer-Books are usually a source of worry to a mind diseased, instead of the comfort they should be. The physician will do well to consider in each individual case, after an examination of the patient, whether it will not be wise to make these books also contraband. It if be decided to forbid the use of Bibles and Prayer-Books, the patient will also, of course, not be allowed to attend church.

Flannelette night garments are to be disallowed for the reason that flannelette is too inflammable, can be torn noiselessly under the bedclothes and a strip of it used for suicidal purposes.

Bed.—It is best to commence the treatment of all cases of insanity by a few days' rest in bed. In chronic cases this gives the physician an opportunity of making a complete mental and physical examination of the patient and allows the nurses time to make observations. In acute cases bed forms an important item in the treatment. The value of bed-treatment has already been insisted upon under the headings of the various diseases for which it is desirable. It should be remembered, however, that the habit of masturbation contra-indicates prolonged rest in bed and that neurasthenics easily contract the 'bed habit'.

The Physician's Behaviour towards the Patient.—It should always be borne in mind that nearly all patients suffering from acute mental disorders are abnormally sensitive. Therefore, if for no other reason, be kind to them and studiously avoid hurting

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their feelings. Remember that ill-humour may be a symptom of their disease and require treating as such. Never allow yourself to feel irritated by patients.

Most patients are aware that they require a strong, robust-minded friend who thoroughly understands their weakness, on whom they can rely for moral support and comfort and in whom they can place implicit confidence; whether they know it or not, the fact is so. The person who should occupy this position in the patient's mind is his physician. The latter should therefore never deceive a patient. From the moment of his entry into the institution, be frank with him. It often happens that a patient is enticed into the institution by means of some little fraudulent device; he is, for example, told that the place is an hotel and his physician is requested not to disillusion him. But to do this would be to lose his confidence for ever. His position should at once be frankly explained to him and subsequent experience of his doctor be such as to teach him that he is dealing with a straightforward man. Further, the doctor's examination must be thorough and of such a nature as to tell him all about his patient and to let the patient see that he knows all about him. Be interested in his conversation and sympathetic, let the tale of woe be never so familiar. By these means confidence will be won.

Lastly, be serious but cheerful. Moods are contagious and words of comfort and encouragement are more readily accepted by a patient if he is in a serious but cheerful mood. Suggestion as to recovery is carried out by pointing out amelioration of symptoms. Delusions should be discouraged, but it is not advisable to argue with a patient about subjects in regard to which his judgment is disordered. Probably the best attitude to take up with regard to delusions is to pooh-pooh them.

Occupation.—This is good for patients, provided it is not of such a nature as to require strenuous physical exertion or mental strain. At Bethlem Hospital many patients are now taught to make baskets and wool rugs, mild occupations which do not interfere with rest in bed. Sewing, knitting and the reading of light literature are also permissible for acute cases. For chronic patients who are capable of employment, regular daily work is not only permissible but directly beneficial. In county and borough asylums much useful work is done and this serves to keep down the rates.

Seclusion and Mechanical Restraint.—When a patient cannot by persuasion be induced to remain in his room and to take his rest, restraint becomes necessary. This may be accomplished (1) by locking the door of his room (seclusion), (2) by a number of nurses holding him or (3) by the administration of powerful drugs such as hyoscine. Of these the last may be directly injurious to the nervous system and is to be regarded as a refined substitute for hitting the patient on the head with a club; the second involves a resistant struggle on the part of the patient, with consequent exhaustion; while the first involves nothing more serious than keeping a record of the number of occasions and number of hours during which the patient is secluded and reporting the same to the Commissioners every three months.

There can be no doubt that seclusion is the least harmful method of restraint. Out of common humanity it should be resorted to as little as possible, for it is naturally somewhat irritating to a patient to be locked in his room. But it is the least of the three evils.

Mechanical restraint may be employed to hamper certain movements of the body for surgical reasons or in order to prevent self-injury or injury to others. The commonest form of mechanical restraint and probably the only necessary form, apart from splints for fractures, etc., is the wearing of soft padded gloves without fingers, in order to hamper prehensile movements. The gloves are fixed on by means of locked straps round the wrists. This mode of treatment should also be resorted to as little as possible, but it is less irritating than being held by the nurses. As in the case of seclusion, all occasions of mechanical restraint must be reported to the Commissioners.

Food and Feeding.—Loss of appetite is one of the commonest symptoms in all acute forms of insanity, while overfeeding is one of the most important indications in the treatment. All food ought therefore to be of the best, nicely cooked, made as palatable as possible and served in a dainty, enticing way. Half a crown or less per week per patient is not enough to spend on food. Quite apart from our duty to the patients, such economy is a short-sighted policy which causes many to become a life-burden on the rates. On a few occasions within the author's experience the Bethlem authorities have broken their twelve-month rule and admitted from county asylums cases of apparently chronic mania and melancholia of more than three years'

duration. By persistent good feeding and careful treatment these have rapidly recovered.

As to the constituents of a good diet, much nonsense is talked nowadays concerning what we should eat. An ordinary English breakfast, dinner, tea and supper of good food in ample proportions, *amplified* proportions for the acutely insane, serve their purpose excellently well. The addition of three pints of milk per diem, perhaps with superadded cream, may be regarded as the specific medicine for these patients.

It is, of course, quite permissible to practise economy in the feeding of those who have become chronic and undoubtedly incurable. They do not need the extra food. Vegetative dements who do no work require less than a normal individual. Their taste is not refined and it can do no harm to supply them with the cheapest food on the market, provided it is wholesome.

In the ordinary way, patients who refuse food are to be fed with a spoon by the nurses ; but the latter should not be allowed to pour fluid nourishment down the patient's throat with the feeding-cup, a pernicious utensil and a fertile source of pulmonary abscess and gangrene.

If the refusal of food becomes so active that the nurses are no longer able to administer sufficient nourishment by means of a spoon, it is necessary for the patient to be tube-fed. Tube-feeding is carried out in the following way : With a funnel attached, a stiff indiarubber feeding-tube is passed into the stomach, a No. 10 *viâ* the nose or a No. 20 *viâ* the mouth gagged open if necessary. By this means the patient is fed with a pint of milk, four ounces of cream and two eggs. This process may have to be repeated three or four times a day for months together. Sleeping-draughts and aperients are administered with the food at the same time ; it matters not how the mixture tastes when passed through a tube, for the patient is then unable to appreciate its flavour.

Some patients are able to prevent the fluid from entering the stomach by keeping the abdominal walls tense. This difficulty may be overcome by the use of a Higginson's syringe, the nozzle being inserted into the end of the feeding-tube.

Care must be exercised to avoid all possibility of food entering the larynx during tube-feeding. If the patient regurgitates gastric contents by the side of the tube into the pharynx, the tube and gag must at once be withdrawn ; for it is impossible for him to swallow the fluid under such circumstances and the

only other way of disposing of it is to inhale it. And in all cases of tube-feeding, when the tube is withdrawn, be careful to keep the funnel low so as to siphon the last few drachms of milk which may be left in the tube, away from the pharynx.

The indigestion of many patients who refuse their food may be much ameliorated by stomach lavage with a dilute solution of bicarbonate of soda, carried out daily as a preliminary to the first feed every morning.

Hydrotherapy. — This is useful mainly in three forms: the prolonged bath, the douche and needle baths and the wet pack.

FIG. 74.—PROLONGED BATH.

The wooden cover, with an aperture for the head, is screwed on top of an ordinary bath. This is, however, usually dispensed with nowadays.

The prolonged bath has already been described in the treatment of acute mania; it serves the purpose of inducing the habit of rest in all cases of acute excitement. The douche and needle baths often serve as a beneficial stimulus to certain stuporose patients, especially cases of anergic stupor; they should not be employed if the patient suffers from cyanosis or œdema of the hands and feet nor before his general nutrition has been considerably improved. A cold plunge is often useful for exhaustion cases during convalescence.

The wet pack is a procedure to be employed only with the most

extreme caution and circumspection, since it is rather exhausting and tends to raise the patient's temperature. It is used to subdue excitement of such a violent character as is likely to prove dangerous, but should not be resorted to unless he is in fairly good physical condition. It consists in wrapping him in a sheet wrung out of water as hot as can be borne, and outside this in a dry blanket. He remains in this sort of general fomentation for about twenty minutes to half an hour, during which time it is well to keep up a supply of cold applications to the head.

Medicines.—Of all the drugs used in the treatment of mental disorder hypnotics are those most frequently used. Their name is Legion and I suppose that no physician has had experience of them all. Certainly I have not; but I give my experience of the sleeping draughts in most common use.

Paraldehyde is a drug which produces sleep within a quarter of an hour and its effects pass off rapidly, within two hours. It is therefore the drug which one selects for those patients who have difficulty in getting off to sleep but whose sleep, when once started, continues for a reasonable number of hours. Its nauseous flavour and the objectionable odour which it imparts to the breath during the following day are its chief disadvantages, but in some cases it also impairs the appetite and in others its continued use is rather liable to induce a mild bronchitis. It is a cardiac stimulant. The initial sleep is profound, sufficiently so to allow of mild operations being painlessly performed on a patient under its influence. The dose is 2 drachms, but double that quantity may be administered without doing any harm.

Amylene hydrate acts even more quickly than paraldehyde. Its effect is more prolonged (six to eight hours). It has the additional advantage of being less nauseous than paraldehyde. It has a somewhat unpleasant camphoraceous taste, but this does not hang about the mouth after the draught is swallowed. The dose is 1½ drachms in an ounce of water. Two drachms is too large a dose, as the profundity of sleep then becomes rather alarming.

Veronal is a useful hypnotic for patients who procure sleep of insufficient duration. If a patient, for example, gets four or five hours without the use of drugs, veronal in doses of 7 or 8 grains will give him another two hours. If, on the other hand, he procures very little normal sleep, veronal is useless in such small doses and if a dose sufficiently large to give him a good

night (14 or 15 grains) be administered, he is sick next day. I have not experienced any other untoward results with veronal.

Sulphonal still maintains an honourable place in the list of hypnotics in spite of its tendency to produce hæmatoporphyrinuria on repeated administration for long periods. Its action is delayed and it should therefore be given three or four hours before bedtime. In some cases of obstinate insomnia it may not act at all for the first two or three nights; but, after that, it becomes more and more effectual. It has the advantage of being a motor sedative and is therefore almost a specific for acute mania. For the prevention of hæmatoporphyrinuria and to aid the action of the drug it is recommended that its administration be followed by a draught of Apollinaris water. Sulphonal tends to produce irritability of temper in some young patients; but it usually suits old people. The usual dose is 30 grains.

Isopral is a latter-day drug which, in doses of 20 to 30 grains, is a good hypnotic and a motor sedative. It has none of the bad after-effects of sulphonal; but it must be borne in mind that it is a vesicant, and should therefore be dissolved in at least an ounce of water.

Trional is, in my experience, a poor hypnotic for insane patients and I have entirely discontinued its use since Soukhanoff stated, in a paper on degeneration of the neuron in animals, that he found this to be the most effective drug for producing neuronal degeneration.

Chloralamide, too, I regard as practically useless for the insane.

Chloral hydrate is a good hypnotic which acts quickly and has, as a rule, no bad after-effects. It is suitable only for depressed patients since it has a tendency to increase motor excitement. It does not find much favour among physicians who have to treat the insane, because its depressing effect on the heart and respiration is somewhat dreaded.

Opium is still one of the best hypnotics we possess and it, or its alkaloid morphia, may have a beneficial effect on the nervous system in some agitated cases of melancholia. Indeed at one time doctors used to talk of the 'opium treatment of melancholia', as if they had found a specific for that disorder. The drug does not, however, find much favour in the treatment of mental disease, partly because opium makes many of these patients sick, but chiefly because it increases constipation which is already troublesome enough among the insane.

Other medicines required in the treatment of these patients are those used to build up the general health. Anæmia, constipation and indigestion are to be treated on general medical principles the discussion of which would be out of place in a manual of this nature.

Masturbation is a symptom which often requires treatment. Devices for its prevention have been invented from time to time but none of them serve their purpose, for the reason that they attract the patient's attention to the very part which already dominates his consciousness too much. The best sexual sedative for the masturbator and one which often serves to break the habit is a mixture containing a drachm of the extract of black willow and 5 grains of monobromate of camphor to each dose. This may be given three times a day after meals.

Prevention of Suicide.—There is only one means of preventing suicide, viz., constant observation. The physician learns by experience to recognize which patients are suicidal and which may be trusted and he must tell the nurses clearly when a patient is suicidal and not to be allowed out of sight. Some very suicidal cases require the whole attention of one or more nurses. Patients must not be allowed access to dangerous weapons or articles with which they can strangle themselves, and the fire must be protected. Apart from such precautions as these, we have to rely on the intelligence of the attendants and it should be the object of all institutions to increase the intelligence of the nursing-staff by instruction and by the removal of those who are incapable of instruction and learning from experience. The writer is strongly opposed to the practice of making rooms and wards in which patients have to live for long periods of their lives unsightly and prison-like with the object of doing away with every conceivable means of suicide. For one thing this cannot be done and, for another, it tends to decrease the sense of responsibility of the personnel.

Visits and Letters from Friends.—A difficulty which often arises in the treatment of the insane is interference on the part of the friends of the patient. It is with the utmost difficulty, in the majority of cases, that these can be made to realize that mental disorder is but a part of a definite disease with a definite physical basis and they believe themselves, in common with the rest of mankind, to be perfectly qualified to treat insanity. For them any person suffering from mental disorder is either an imp of

wickedness or a lazy scoundrel and they have no patience with any person who is ' fool ' enough to believe things which are manifestly untrue.

Accordingly they seize upon the opportunity of their visits to scold the patient for daring to be depressed or excited and to threaten him with imprisonment for life or something worse by way of an antidote to his delusions. Letters are no better. Instead of containing words of encouragement they contain threats of desertion and other dire consequences in the event of the patient persisting in his delusions. Of course such treatment is most deleterious to his progress and if, after due explanation and warning, his ' friends ' continue to worry him in this way, there is no other course open to the physician than to put a stop to visits and letters. Fortunately the friends of the patients are not all so foolish and some do a great deal of good. I regret to say that this is the exception. An observant physician will soon learn which patients are worse after ' visiting-day ' and he will act accordingly.

Convalescence.—When convalescence is established the patient may attend ' associated entertainments ' and be encouraged to take exercise. He may be allowed to go out for walks, at first with a nurse, then with his own friends if they are trustworthy. Later he may be permitted to go out for walks by himself, after having given his word (parole) to return to the institution at a given time and to abide by any restrictions which the physician may think wise to bestow on him. Finally, before leaving the institution, the physician should advise him as to his subsequent mode of living with a view to preventing the recurrence of his disease.

CHAPTER XXIII.

CASE-TAKING.

In all cases of illness, it is advisable to obtain some history of the patient before proceeding to examine him; but in cases of mental disorder this must be obtained from the friends, since the statements of the patients are liable to be erroneous.

Probably the best way to take the history of an existing illness is to ask for the first symptom that led the friends to think that there was anything wrong with the patient and to get a detailed history of his symptom up to date. Then ask what was the second symptom noticed and obtain a detailed history of this up to date, and so on with the third, fourth and subsequent symptoms. The friends should be asked when the patient left work, and why. Finally, discrepancies and fallacies should be pointed out and gaps filled up. It is also well to ask for supposed predisposing and exciting causes with the evidence of etiological relationship.

An account should then be obtained of the patient's ordinary health, of the regularity of the bowels and catamenia, of previous attacks of similar or allied diseases, of previous illnesses of other kinds and especially of venereal disease. In the case of women, evidence of the last is usually to be obtained indirectly by inquiries respecting skin eruptions, falling of the hair and miscarriages.

The patient's previous habits should be investigated with respect to food, alcohol, idiosyncrasies and any special liability to business or domestic worries.

In obtaining the family history the medical man should ask about the age and general health of the parents, grandparents, brothers, sisters and children and especially find out whether there has been any other mental or nervous disease in the family.

The examination of patients suffering from mental disorder cannot be carried out in a routine manner as in the case of

patients suffering from other diseases. With the former greater patience is required and allowances must be made for caprices and whims. The physician will, of course, direct the course of conversation to the best of his ability, but the patient must be allowed to have his say. One cannot, therefore, lay down hard-and-fast rules as to the order in which the various mental faculties are to be examined. Further, the doctor will find it necessary to vary his mode of examination in accordance with the kind of patient with which he finds himself confronted. It is hoped, however, that the following may serve as a useful framework on which to base the scheme of examination. It will be seen that, in the first instance, this partakes, more or less, of the nature of an ordinary conversation.

Greeting :

' Good-morning !' Offer the hand and notice whether the patient's handshake is of the maniacal, melancholiac or præcox variety. If he refuses to shake hands, endeavour to find the reason for his refusal.

Ask his name, age, civil state and occupation. With the object of making a preliminary test of his memory and of ascertaining the length of his illness, ask him when he was last engaged at his usual occupation.

' How are you ?' (In an institution) ' Why have you been brought here ?' (In private) ' Why have I been called to see you ?' The answer to these questions will reveal whether the patient has any insight into the nature of his illness and, *ipso facto*, whether he has any delusions.

Orientation in space :

' Where do you live ?' ' Do you know what place this is ?' ' Where is it situated ?' ' How far is it from your home ?' ' By what route did you come here ?'

Orientation in time :

' How long have you been here ?' ' What is the day of the week ?' ' Of the month ?' ' What month is it ?' ' What year ?' ' What time do you think it is ?'

Associative memory :

' Who brought you here ?' ' When did you arrive ?' ' What were you doing a week ago ?' ' A month ago ?'

Recognition :

' Have you ever been here before ?' ' Do you know who I am ?' ' Do you know any of these people present ?'

Perception :

' What sort of a place do you think this is ? Is it a theatre ? club ? hospital ? hotel ?'

For the purpose of further testing simple perception the physician should carry a few articles in his pocket, such as a fountain-pen, a pencil-holder, a matchbox and a button-hook as well as a few unfamiliar objects to serve as more severe tests such as a pocket stamp-case, a tape-measure, a tie-clip, a retinoscope and a piece of black sealing-wax. The author usually carries a small letter-opener with a large lens set in one end of it and uses it for this purpose. The patient is required to name such objects and to say what each is for. The same articles may be used to examine for apraxia by asking the patient to show how he would use them. Picture-books, especially children's picture-books, are also useful. Customarily the author uses two of these : one, Dean's rag ' Baby's Object Book ', gives pictures and names of common objects and serves as a mild test for severe cases ; the other, ' Proverbs Old Newly Told ', published by Raphael Tuck and Sons, has pictures which portray proverbs and serve as a severe test for mild cases. In practice, the letter-press is covered up and the patient is required to identify the object or proverb, as the case may be. It is advisable occasionally to try normal people with these to make sure that the test is not too severe.

Ideation or the revival of memory images is perhaps best tested by asking the patient to enumerate a dozen birds, a dozen fishes or a dozen flowers. In severe cases, the physician will do well to choose objects with which the patient is very familiar ; while, to test the progress of a convalescent patient, he will ask for something more difficult, *e.g.*, a dozen people whom one sees in uniform in the street.

Auditory perception is tested by asking the patient to recognize some familiar sound, such as the rattle of keys, the tearing of paper or the spurt of a soda-water siphon behind his back. Auditory word-perception is tested by giving some simple command in a monotone and without gesture, *e.g.*, ' Put your left hand on your right shoulder ' or, as a slightly more severe test, asking some question more or less complex, such as ' Would you prefer a brown coin to a yellow one ?'

Taste and smell perceptions may be examined with a series of test solutions such as, for the former, dilute solutions of salt,

sugar, quinine and citric acid and, for the latter, oil of cloves, oil of peppermint, tincture of asafœtida and essence of lavender. Cutaneous anæsthesia may be examined and charted at this stage.

It is while these tests are being carried out that it is best for the physician to inquire for hallucinations :

' Are you ever troubled by lights or visions of any kind, such as faces appearing before the eyes, especially at night when your room is dark ?' ' Do they occur during sleep or when you are awake ?'

' Do you suffer from noises in the ears ?' ' Do you ever hear sounds which seem like people talking, especially during the silence of the night when there is nobody present ?' ' Do you recognize the voices ?' ' What do they say ?'

' Do you experience unpleasant or otherwise strange and unaccountable sensations of taste ?' ' Or of smell ?' ' Do you often think that there is something burning or that the drains are defective, when other people say that they smell nothing of the kind ?' ' Have you any pain or discomfort anywhere ?'

Delusions :

' How do you account for these visions, voices, odours and other sensations ?' ' Do you realize that they are the outcome of your present nervous condition ?' ' Do you think there is anybody who wishes to do you any harm, who exercises any occult influence over you or reads your thoughts ?' ' Do you suffer from a feeling that something dreadful is going to happen ?' ' Are you particularly worried over religious matters ?' ' Do you sometimes feel that you have led a wicked life ? And that your soul is lost ?' ' Are your financial affairs sound ?'

During this examination the doctor will have noticed peculiarities about the patient's general attitude and behaviour. He will have ascertained whether the prevailing affective tone is one of depression or exaltation ; and he may test emotional reaction by showing the patient a comic picture and observing whether he laughs or not. Further inquiries may now be made of the nurses or relations concerning the patient's habits. The latter should also be questioned with regard to statements made in the certificates concerning him.

The medical man may now proceed to ask the patient about his physical health as in an ordinary medical case, endeavouring to elucidate symptoms of disorders of the circulatory, respiratory, digestive and other systems and, incidentally, he will note

whether he appears to be suffering from hypochondriacal delusions or has distorted views of the nature of his illness.

Then follows the ordinary systematic physical examination. Note the general aspect and complexion, the colour of the skin and mucous membranes, the presence or absence of wounds, bruises, bedsores, scars and skin eruptions.

Observe the facial expression, and note physical stigmata and other obvious deformities.

Examine the general nutrition, note signs of wasting and have the weight and temperature taken. Observe whether the extremities are cold, cyanosed or œdematous. Note the frequency and other characters of the pulse and respiration. Look at the tongue and see whether it is furred, coated or plastered, white or brown, dry or moist.

Make an examination of the chest and abdomen and test the urine.

If the patient suffers from headache, make inquiries as to its position, characters and associations. Find out during which part of the night he sleeps and for how many hours.

If he suffers from fits, get a description of them. Is there any assignable cause for them ? When did they begin ? What were the longest and shortest intervals between them and when did those occur ? Is there any aura ? If so, how long after the aura does the convulsion begin ? Is the onset sudden or gradual ? Does the patient scream at the onset or during the fit ? Does he bite his own tongue or other people or things ? Does micturition or defæcation take place ? Is restraint necessary ? If so, is it to prevent accident or violence ? What is the duration of a fit ? Is the termination spontaneous or induced ? What symptoms occur afterwards—sleep, headache or automatism ?

If the medical man has an opportunity of observing a fit, he should note the order of convulsion of various parts of the body and limbs, the colour of the face, the conjunctival and pupillary reflexes, the response to a pinprick and the mobility or immobility of the chest. He should also examine the knee-jerks during, immediately after and some time after the convulsion.

In the physical examination of the nervous system, special attention should be devoted to the eyes. The vision should be tested and errors of refraction recorded. Are the visual fields contracted ? Are there any positive or negative scotomata ? Examine the fundus oculi with the ophthalmoscope and note

especially whether there is any swelling of the optic disc. Test the movements of the eyes and note whether there is any nystagmus. Do the pupils react to light ? Do they contract on convergence ?

Is there any defect of hearing as tested with the tick of a watch ?

Are the muscles or nerves of the limbs tender to pressure ?

Observe the position of the trunk, head and limbs while at rest. Notice whether there is any rigidity of these and whether there are any abnormal movements, such as tremor. Examine for flexibilitas cerea and echopraxia and note signs of negativism.

Test the superficial reflexes, especially the epigastric, cremasteric and plantar. Examine the tendon reflexes, especially the knee-jerk. Test for rectus clonus and ankle clonus. Note disturbances of organic reflexes—deglutition, appetite, vomiting, defæcation and micturition. If there is incontinence, determine by passing a catheter whether it is reflex or overflow.

Note vasomotor and trophic changes and observe whether perspiration is excessive or deficient.

Observe the gait.

In examining the articulation, get the patient to repeat some of the usual test phrases : Irish artillery, Biblical commentators etc.

Is speech excessive or deficient ? Is it coherent ? Is it abusive and does the patient use coarse language ? Can he read correctly ? Can he sing a song with the words ? Note verbigeration, echolalia and pseudolalia.

Lastly, obtain a specimen of the patient's writing and study it carefully ; for the whole of a patient's thought and action are reflected in his writing.

It is frequently helpful, too, to get him to make some simple arithmetical calculation on paper, *e.g.*, to multiply 345 by 67.

CHAPTER XXIV.

FEIGNED INSANITY.

INSANITY is sometimes feigned by criminals with the object of escaping punishment, by soldiers and sailors in the hope of obtaining discharge from the services, by others seeking to evade duty or legal obligation imposed on them by a contract into which they have entered, by hysterical patients seeking sympathy and, in rare instances, by enterprising newspaper reporters who, in search of copy, endeavour by this means to gain admission to an asylum.

In such cases a medical man may be called to determine whether the mental disorder is real or assumed. When, under these circumstances, he is confronted with a subject suspected of malingering he should frankly make the object of his visit known and, if there is any detective work to be done, this should be relegated to an observant and intelligent attendant.

A careful history of the mental symptoms must be taken. It should be noted whether there is any motive for malingering and, if so, what was the temporal relationship of the mental symptoms to the motive. It is also to be ascertained whether there were any premonitory symptoms of mental disorder, whether it developed suddenly and whether there were any previous signs of ill-health. Due attention should be paid to any history of previous mental disease in the subject or his family.

Several visits are usually necessary before coming to a decision. The patient should be examined for the usual physical concomitants of mental disease, such as physical stigmata, furred tongue and disordered digestion with consequent refusal of food, and constipation.

In uncomplicated cases the diagnosis is easy, the chief characteristics of feigned insanity being (1) incongruity of symptoms

and (2) tendency of the subject to show any symptom which appears to be expected of him. One mode of eliciting the latter tendency is to remark in the patient's hearing that there would be no doubt as to his insanity if such and such a symptom were present. The ruse is not often successful; but, in some cases, the said symptom makes its appearance at the next visit.

As a rule, however, the diagnosis is no simple matter; for insanity is usually simulated by those who have previously had an attack of mental disorder or, at the time of examination, exhibit symptoms of undoubted mental instability. Indeed it is doubtful whether malingering is ever attempted by a person who is mentally sound; and we have to be prepared for subjects who are really suffering from one form of insanity but simulate another.

As the reader has learned from previous chapters, insomnia is almost a constant feature of the acute forms of mental disorder; but a malingerer sleeps soundly for many hours at a time, especially if he has set himself the task of simulating acute mania or some other form of motor excitement.

The simulation of anæsthesia is readily detected and usually arrested by means of faradism with a wire brush.

If a malingerer feigns imperception when he is asked to recognize common objects, he makes more stupid mistakes than those of a patient who is really suffering from imperception. He may, for example, call a coin a watch and a pencil a key. Hallucinations are seldom feigned unless they are suggested to the subject.

Amnesia is a symptom which easily lends itself to simulation and is therefore often feigned. The malingerer, however, usually makes the mistake of introducing this symptom among others with which it is incompatible. He will, for example, feign acute mania with loss of memory for remote instead of recent events. He will remember trivial factors of an incident, such as a crime which he has committed, but will pretend loss of memory of the most important factors, viz., the crime itself.

When delusions are feigned the malingerer gives expression to them obtrusively. A patient who is really deluded keeps them in the background. Again, feigned delusions change from day to day, being sometimes expansive, sometimes depressive. It may usually be observed, too, that the delusions are at variance with the subject's conduct. Delusions of persecution are frequently selected.

Motor excitement corresponding to the popular conception of ' raving madness ' is sometimes feigned. But nobody can maintain such excitement hour after hour and day after day, like a person who is really insane ; the work is too hard. Similarly the malingerer sets himself a difficult task if he attempts to be incoherent in speech ; the deception can only be kept up for a minute or so.

The conduct of a malingerer is most faulty and ridiculous when he is under ostensible observation ; his conduct is normal when he thinks he is unobserved. An insane patient, on the contrary, tends to pull himself together when he is being observed.

Simulation of melancholia is infrequent. Indeed the malingerer rarely attempts to feign any particular psychosis ; he merely wishes to be thought ' mad ' and takes no account of the fact that the modern study of mental disease has reached such precision as to render detection fairly easy.

CHAPTER XXV.

THE INSANE AND THE LAW.

In the majority of cases of mental disease the patient either has no insight into the nature of his condition or, if he has, is unwilling or unable to make up his mind to place himself under care and treatment. Accordingly it becomes necessary for his friends or relations to place him under care against his will, either in his own interest or for the sake of the public. Now the law will allow such trespass against the liberty of a subject only under certain conditions, which will be considered in the present chapter. We shall further have to note the extent to which it will allow a patient mentally diseased to exercise certain civil rights and how far it will excuse him from his civil and criminal responsibilities.

The carrying out of the Lunacy Act is entrusted to a Board of Commissioners consisting of a Chairman, Vice-Chairman, Secretary and six Commissioners. The Secretary and three of the Commissioners are barristers; the other three are medical men.

All institutions for the reception of patients suffering from mental disease who, under the law, are spoken of as 'Lunatics', 'Persons of Unsound Mind' (*non compos mentis*) or 'Idiots', are under the jurisdiction of the Commissioners in Lunacy. These institutions are of three classes:

1. **Private Asylums or Licensed Houses.**—Each of these is the property of one or more private individuals who for a fee (£15 or more annually, according to the number of patients accommodated in the institution) obtain for their asylum a licence which must be renewed from year to year. To comply with the law one of the licensees must be resident in the asylum. In London and a specified surrounding area such institutions receive six visits every year from the Commissioners. Outside this area

private asylums receive annually two visits from the Commissioners and four from Justices of the Peace appointed under the Lunacy Act.

The friends of the patient pay for his maintenance in the institution, the fee varying usually from two to twelve guineas weekly according to his requirements. In the grounds of some private asylums there are suitable villas where a patient may be treated and attended by a complete staff of nurses and servants; under such circumstances the weekly payment reaches £50 or more.

2. **Licensed Hospitals** are self-supporting and usually endowed institutions for the treatment of private patients, the funds being under the control of a committee of visitors. Fees from paying patients are utilized purely for the maintenance of the hospital and not for the personal profit of any private individual. Hospitals in Home Counties are visited twice a year by the Commissioners, those in the provinces once a year. Annual renewal of the licence is not required.

3. **Public Asylums.**—These are the county and borough asylums erected and maintained out of the rates for the treatment of pauper lunatics; the State Criminal Asylum at Broadmoor, erected and maintained by the State, the patients being paid for out of the rates of the borough or union to which they are chargeable; the Royal Military Hospital at Netley and the Royal Naval Hospital at Great Yarmouth, both erected and maintained by the State. Some of the county and borough asylums receive a few private patients and all of them, as well as the registered hospitals, may receive 'criminal lunatics'. All public asylums are visited once a year by the Commissioners.

To accommodate the large class of people who are anxious to spare their friends and relations the stigma of detention in an asylum or licensed house, the law allows one, but only one, insane patient to be detained and treated in a private dwelling, for profit, provided he is certified and reported to the Commissioners in Lunacy. Under such circumstances the house is liable to be visited by one of the Commissioners at any reasonable time, when he must be afforded facilities for seeing any part of the house. To receive more than one patient in a private dwelling the house must be licensed, unless the Commissioners grant a special permit for the reception of two patients.

A patient suffering from mental disorder may voluntarily place

himself for treatment in any house or institution whose occupants are willing to receive him for profit ; and he may be detained and treated under the common law (*i.e.*, uncertified) against his will in any house or institution whose occupants are willing to receive him, provided this is not done for profit. Although a person receiving a patient under such circumstances is not liable under the Criminal Law, it must not be forgotten that he runs the risk of a subsequent civil action brought against him by the patient. The position of affairs is that it is only safe to detain an uncertified patient under such circumstances when he is dangerous either to himself or to others, and then merely as a temporary measure pending certification.

There is no provision for voluntary boarders in public asylums, but an uncertifiable patient may place himself for treatment in a hospital or licensed house on the understanding that he may be allowed to leave within twenty-four hours of giving notice to do so. In the case of a licensed house, the intending boarder must first obtain from the Commissioners (or two local justices if the house is in the provinces) their consent, which may be given for a specified time only. It is not necessary for intending voluntary boarders in licensed hospitals to apply to the Commissioners. After the admission of a voluntary boarder notice of the same must be sent to the Commissioners within twenty-four hours.

The following are the modes of procedure by which a patient may be placed under care, usually against his will :

1. Reception Orders on Petition.
2. Urgency Orders.
3. Summary Reception Orders.
4. Orders for lunatics wandering at large and for pauper lunatics.
5. Reception Orders by two Commissioners.
6. Reception Orders by the Home Secretary (used in criminal cases, *v.* p. 464).
7. Orders after Inquisition.

Reception Orders on Petition.—This is the ordinary mode of procedure for *private patients*. The necessary documents are a petition, statement of particulars, two medical certificates and an Order.

The Petition is a document asking some particular judge, magistrate or justice of the peace appointed under the Lunacy Act to make an order for the reception of a patient into a particular

asylum, hospital, licensed house or private dwelling. It must be signed, whenever practicable, by the husband, wife or a relative of the patient, who must have seen him within fourteen days of the presentation of the petition. If any other person sign the petition, the reason must be given. In any case the petitioner must be above twenty-one years of age.

The Statement is also signed by the petitioner. It contains particulars as to the name, age, sex, civil state etc.

One of the medical certificates must, whenever practicable, be signed by the usual medical attendant, unless he be related to the patient or the petitioner. Neither certificate may be signed by

(1) The manager of the institution or the person who is to have charge of a single patient ;

(2) Any person interested in the payments on account of the patient ;

(3) Any regular medical attendant of the institution ;

(4) The husband or wife, father or father-in-law, mother or mother-in-law, son or son-in-law, daughter or daughter-in-law, brother or brother-in-law, sister or sister-in-law or the partner or assistant of any of the foregoing persons.

If it be desired that the usual medical attendant continue to attend the patient, neither he nor his partner must sign either of the certificates and he must have no monetary interest in the house to which the patient is sent.

The medical practitioners signing the certificates must, for purposes of certification, examine the patient separately and at a time not exceeding seven clear days before the presentation of the petition to a justice.

The certifying practitioner is required to state facts observed by himself at the time of examination and he is at liberty to add facts communicated by others. He should confine his statement to *facts* which, either individually or considered in relationship to one another, are such strong evidence of insanity that he would be willing to be cross-examined on them in a court of law. Irrelevant statements, expressions of opinion and records of physical signs should find no place in a certificate. For example, the following, culled from this year's certificates at Bethlem, should have been omitted : ' His demeanour indicates an unhinged mind '; ' Wild look in the eyes '; ' Speaks lucidly at intervals '; ' Patient's tongue is tremulous and his articulation is indistinct '; ' Patient says I am a fool '.

No medical man is bound to sign a certificate ; but, if he does so, he must remember that any wilful misstatement is a misdemeanour. If he acts in good faith and with reasonable care he is not liable to any civil or criminal proceedings. If such proceedings are taken against him, they may be stayed on summary application to a judge of the High Court, provided that the judge is satisfied that the medical man acted in good faith and with reasonable care.

The Order, authorizing some person to receive the patient into his institution or house, may be signed by a judicial authority with or without seeing the patient, after he has perused the petition, statement and certificates.

Should he wish to see the patient before signing, he must appoint a time within seven days for doing so. Having seen him he may either sign the order forthwith or again postpone the matter for a period not exceeding fourteen days.

When a patient is admitted to an institution or house without having been seen by a justice the superintendent or medical attendant must give notice in writing to the patient that he has a right to be visited by a justice and, if the patient desire it, allow a justice to visit him ; or, if the medical attendant considers that this would be prejudicial to the patient, he must send to the Commissioners a certificate to this effect.

It is obvious that the above procedure, even at the shortest, takes some considerable time, probably two or three days ; but in certain cases, especially those in which the patient is dangerous to himself or others, it is desirable that he should be placed under care forthwith. This may be done by making use of the Urgency Order.

Urgency Orders.—In this mode of procedure no petition is necessary ; authority to receive the patient is granted, whenever practicable, by the husband or wife or a relative of the patient. When it is granted by any other person the reason for the departure must be given. The person signing the order must have seen the patient within *two days* of his doing so. The Order must be accompanied by a statement of particulars, similar to that accompanying a petition, and by one medical certificate. The certifying medical practitioner must have seen the patient within *two clear days* of his signing the certificate. This certificate differs from the ordinary schedule form in that it must contain a clause giving the reasons for urgency. An Urgency Order

remains in force seven days or, if a petition for a Reception Order is pending, until the petition is finally disposed of. In practice a Reception Order or petition has to be completed within seven days of the signing of the Urgency Order.

Summary Reception Orders. — Every constable, relieving officer or overseer of a parish, who has knowledge that any person within his district, who is not a pauper and not wandering at large, is deemed insane and is not under proper care and control or is being cruelly treated or neglected, shall within three days give information on oath to some judicial authority under the Lunacy Act, usually a justice of the peace. The justice shall then direct two medical practitioners to examine the patient and certify as to his mental state. If these certify that the patient is insane and a proper person to be detained under care and treatment, the justice may sign an order for his removal to a house or institution for the insane. The documents used in this mode of procedure are the same as those for a Reception Order on petition, except that there is no petition.

Orders for Pauper Lunatics and Lunatics wandering at Large.— The law enacts that such persons be apprehended by the local constable, relieving officer or overseer of the parish and that they be taken before a justice. In practice the patient is taken to the infirmary of the union in which the patient is apprehended and is there visited by a justice. If the justice considers the patient to be insane, he directs that he remain under observation in the infirmary for a period not exceeding fourteen days. If, at the end of this time, he considers the patient still insane, he directs a medical practitioner (usually the medical officer of the infirmary) to examine the mental state of the patient. If the medical practitioner certifies that the patient is insane, the justice makes an order for his reception into an institution for lunatics, unless the medical officer certifies in writing that the patient is a proper person to be detained as a lunatic in a workhouse. It will be observed that only one medical certificate is necessary in the case of pauper lunatics and lunatics found wandering at large.

Order by Two Commissioners.—Any two or more Commissioners may visit a patient, not in a workhouse or institution for lunatics, call in a medical practitioner and, if he certifies the patient to be insane, order the patient to be removed to an institution for the insane.

Orders after Inquisition.—A person found lunatic by inquisition may be received on an order signed by a committee of the person of the lunatic, or on an order signed by a Master in Lunacy.

Judicial Inquisition as to Lunacy.—The Judge in Lunacy may, upon application, by order direct an inquisition whether a person is of unsound mind and incapable of managing himself and his affairs. The patient may claim and is entitled to be examined before a jury. The inquiry is limited to things said and done by the patient within two years of the inquisition. The chief witnesses are medical men including those who have signed certificates and affidavits with regard to the mental condition of the patient and usually others who may be called as expert witnesses for both sides. These are examined and cross-examined on oath before a Judge or Master in Lunacy, either in open court or in private, just as in an ordinary trial.

The jury may return one of three verdicts:

1. That the patient is capable of managing both himself and his affairs.

2. That he is incapable of managing either himself or his affairs.

3. That he is capable of managing himself but incapable of managing his affairs.

The contingency of a person being capable of managing his affairs but not himself does not occur. If the jury find verdict (2), the Master in Lunacy appoints a 'Committee of the Person' and a 'Committee of the Estate', who may be one and the same person. The patient is thenceforth known as a 'Chancery lunatic' and he is regularly visited by one of the Lord Chancellor's visitors, two of whom are barristers-at-law and three are medical men. If verdict (3) is returned, the Master appoints a 'Committee of the Estate' but not a 'Committee of the Person'; and the patient is free to go about as he chooses.

It is, however, not always necessary to resort to the expensive procedure of an inquisition when it is desired to have a 'Committee of Estate' appointed. Provided that the value of the patient's property does not exceed £2,000 or the income therefrom £100 a year, and provided that the patient makes no objection to the appointment of a Committee of his estate, a summons may be taken out in Chambers before one of the Masters in Lunacy. A copy of this, endorsed with a notice signed by the

applicant or his solicitors, is served on the patient, giving him at least seven clear days' notice of the intended application. At the hearing, evidence of this service is required together with copies of the original certificates and an affidavit of a medical man, usually the superintendent of the institution in which the patient is under care. The Master certifies the result to the Judge in Lunacy who then appoints a Committee of Estate.

An idiot or imbecile may be received into an institution for idiots and imbeciles on the production of one medical certificate and a statement signed by the parent or guardian of the idiot or imbecile. Such institutions are visited by the Commissioners once a year.

Within one clear day of the reception of a patient into an institution or private house, notice of the same must be sent to the Commissioners, together with a copy of the admission papers.

Not less than two days and not more than seven clear days after the reception a medical statement as to the mental and physical condition of the patient must be forwarded to the Commissioners. Another similar report must be sent at the expiration of one month. In the case of patients in single care such a report is also required by the Commissioners during the week following January 10 in each year.

A Reception Order expires at the end of one year from its date. If it is desired to keep the order in force for a further period, a special report as to the mental and physical condition of the patient must be sent to the Commissioners not more than one month or less than eight days before the expiration of the order, together with a certificate that the patient is still of unsound mind and a proper person to be detained under care and treatment. Similar reports and certificates must, if necessary, be sent at the expiration of the second, fourth and seventh years and, after that, every five years.

These continuation certificates are not required in the case of criminal patients detained on an order by the Home Secretary.

When a patient recovers or is otherwise discharged or removed notice must at once be sent to the Commissioners.

The manager of an institution may, if he think fit, grant two days' leave of absence to any patient under his care. For longer periods permission is granted by the Committee of Visitors in the case of licensed hospitals and public asylums, by the Commissioners in the case of licensed houses in the Home Counties

and by the justices in the case of licensed houses in the provinces.

Transfer.—No certified private patient may be transferred from one institution to another without the consent of the Commissioners. These have the power to allow the transfer of a patient from a public asylum to a licensed house and from the pauper to the private class. It will be seen that, under such circumstances, a private patient may be detained on one medical certificate.

Escape.—If a patient escape, he may be recaptured at any time within fourteen days and detained on the original order and certificates. Notices of escape and recapture must be sent to the Commissioners within three days, or, in the case of a Chancery lunatic, to the Chancery Visitors.

Legal Capacities of the Insane.

1. **As Witnesses.**—As a general rule the insane are regarded as incompetent to give reliable evidence; but the law allows the presiding judge to decide the matter in each individual case and it is left to the jury to determine how much importance they will attach to the evidence of an insane person.

In the case of written evidence (affidavits) a preliminary inquiry must be held to determine whether the person's insanity is of such a nature as to render unreliable his evidence upon the particular matter under consideration.

2. **As Testators.**—For a will to be valid the law requires the testator to have a 'sound disposing mind' either at the time when he gave instructions for the will to be prepared or at the actual moment of its execution; it is not necessary that he should have a 'sound disposing mind' on both occasions.

It often falls to the lot of a medical man to examine a patient in order to decide whether he is of a sound disposing mind. When called upon to do so he should make written notes of the examination; and he should endeavour to ascertain

(*a*) Whether the patient is capable of enumerating, on the one hand, the details of his estate and, on the other, the individuals who have any reasonable claim to benefit from it;

(*b*) Whether there appears to be any person who has exercised undue influence on his decision;

(*c*) Whether the patient is suffering from any delusion which

might influence his decision and whether he has any insane dislike to or suspicion of any members of his family, who would in the ordinary course become beneficiaries ;

(*d*) Whether, having once announced his decisions, he is capable of recapitulating them, say a few days later.

These are the main points upon which the medical man will be cross-examined should he be called upon to give evidence when the will is disputed.

The law upholds a will made from eccentric, frivolous or capricious motives, provided it can be shown that the will represents the true wishes of the testator and was not the result of an eccentricity, frivolity or caprice of the moment.

It is a general rule at law that an idiot cannot make a will.

Civil Responsibilities of the Insane.

Contracts.—The occurrence of insanity does not excuse the patient from the performance of a contract made previously to his becoming insane.

Contracts for ' necessaries ', made by an insane person not so found by inquisition, are binding. By the term ' necessaries ' is meant such articles as clothing ; but the term is an elastic one and it is left to the judge and jury to decide what articles are ' necessaries '.

An insane person, not so found by inquisition, or a person who is drunk may make contracts other than for necessaries. These are binding unless the contract is of such a nature that it would not have been made but for the unsound mental condition at the time of making the contract. He cannot, however, set up his own insanity as a reason for nullifying the contract, even if the other party knew of the insanity at the time. If he did not know, the insanity must be set up by the patient's representatives, such as a committee of his estate or the executors of his will after his death or by a relative.

A contract is always binding on the second party whether he knew of the insanity or not, except in the case of a marriage contract. In the latter case the Divorce Court will grant a decree of nullity of marriage on application of the second party, provided it can be shown that he was not aware of the insanity at the time of the marriage. Insanity occurring subsequently to marriage is no ground for divorce.

Torts.—A ' tort ' is an injustice or wrong, done to another person, which renders the offender liable under the civil law but not under the criminal law. Libel and slander may be cited as examples of torts. Adultery also is a tort, because it is a wrong to the other party to the marriage. Theft, embezzlement, rape and murder are not torts ; they are crimes.

In English law, insanity is no excuse for a civil wrong. The injured party is entitled to damages on the principle that every man is entitled to possess inviolate his personal security, liberty and reputation. The amount of damages is, however, left to the discretion of the jury and it is not likely that they will award heavy damages, say, in a case of slander in which the offender is known to be so insane that nobody would attach any importance to his statements.

Criminal Responsibility.

When a man commits a crime the law demands that he shall be punished ; but if the crime was committed at the instigation of another or as the result of the action of another, the law is that this latter person is responsible for the crime and must therefore be punished. This principle is well illustrated by the following extreme case from an American civil court—I quote it from ' The Insane and the Law ' by Pitt-Lewis, Percy Smith and Hawke : ' A man, having had a quarrel in the street with a boy, followed him into his master's store into which the boy ran for refuge. While the man was running round the store after him the boy, in trying to keep out of the way, ran against the " faucet " (or " spile ") of a cask of wine and knocked it out. In consequence a quantity of wine ran out and was wasted. The man was held to be answerable to the owner of the store (the boy's master) for this ; it being given as the ground for so deciding that, at the time when the accident happened, he was doing an illegal and mischievous act which was likely to prove injurious to others, and must accordingly be held responsible for the direct and natural consequences which resulted from what he did, whether he actually intended them or not.'

Bearing this principle in mind, a man who commits a crime as a direct result of disease is not to be held responsible at law for his action. The disease is in reality the responsible agent. Accordingly the law deals leniently with a person who has

committed a crime but is proved to have been insane when he did it.

At a time when public feeling was running high on account of the acquittal of one MacNaughton who in 1843 shot Mr. Drummond, the private secretary of Sir Robert Peel, supposing that Mr. Drummond was Sir Robert Peel himself whom the murderer wildly suspected of having some connection with an imagined system of persecution against him, the House of Lords summoned all the judges and put to them a series of questions, the answers to which constitute the highest expert legal opinion which has ever been obtained on the criminal responsibility of the insane. This opinion may be expressed as follows: If a person suffers from a delusion but is not otherwise insane, he is to be held responsible and punishable for his offence, unless he has acted in such a way as would have been permissible, had the facts about which his delusion exists been true. For example, if a man kills another whom he believes to be about to kill him (*i.e.*, in self-defence), he is to be held irresponsible; but if he kills another whom he believes to be robbing him, he is to be held responsible and punishable. In other cases, it must be clearly proved, to establish a defence on the ground of insanity, 'that, at the time of committing the act, the party accused was labouring under such defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing or, if he did know it, that he did not know he was doing what was wrong'. This is not the law on the subject; it is merely an authoritative expression of opinion on the way in which the law should be administered and the judges of the present day, while they do not all consider the answers of the judges in 1843 as binding, find in them a sound working basis for their administration of the law.

In the light of experience these rules, so far as they go, seem very fair and just. It would certainly be an erroneous principle to make every form of insanity an excuse for crime. Everybody with a large experience of the insane knows that many of them take an unfair advantage of the fact, which they very soon learn, that they are immune from punishment and other natural consequences of their actions, so long as they remain in an institution for the insane. It would probably be wrong, for example, to allow a simple maniac, who had shot his father, to go unpunished. But if a person suffers from the delusion that his

father is in imminent peril of undergoing some excruciating torture and kills him with the object of sparing him that torture, he is not to be held responsible for his action ; because, at the time of committing the act, although he might know that what he was doing was legally wrong and punishable, he would consider that he was doing what was morally right. This point must be borne in mind by medical witnesses when they are asked, as they always are, whether the prisoner was capable of distinguishing right from wrong. The question does not mean 'Was the prisoner capable of distinguishing what is legally right from what is legally wrong ?' It means 'Was he capable of distinguishing what is morally right from what is morally wrong ?' Again, the question does not refer to the prisoner's general knowledge of right and wrong ; it refers to his knowledge of right and wrong in respect to the very act with which he is charged.

The answers of the judges do not, however, go quite far enough. They take no account of certain forms of mental disorder which, in the opinion of medical men, should excuse a prisoner, charged with a crime, from punishment.

In the earlier chapters of this volume we have frequently had occasion to remark on cases in which, owing to degeneration or incomplete evolution of the volitional system, the instinctive system is insufficiently controlled. In these cases instinctive actions, of such a nature as to render the patient liable under the criminal law, may occur in spite of the strongest desire on his part to avoid them. Especially are these likely to occur in early cases of arteriopathic dementia and in cases of impulsive insanity.

We have seen that in early arteriopathic cases the sexual instinct often becomes uncontrollable. Further, it has a great tendency to find an outlet in morbid directions. A man, for example, previously known to be of the highest moral character, in his old age suddenly becomes addicted to fornication or the abuse of little girls. The judges have hitherto persistently refused to realize that such actions, in the cases referred to, are the result of disease, as the subsequent history of all these criminals shows. They are sentenced to long terms of imprisonment, often with hard labour, the result of which can only be to precipitate the arterial degeneration already begun.

I believe there is an increasing tendency on the part of the Bench to accept impulsive insanity (psychasthenia) as an excuse

for crime, but it is not by any means universal. I have had several patients under my care, who came to Bethlem as voluntary boarders to be cured of a constantly recurring impulse to kill their children. Some of these have told me that if, by some mischance, one of their children had suddenly appeared in close proximity, when they had happened to have a hatchet or a knife in hand, the child would certainly have been killed before the parent could have had time to realize the awfulness of his crime. Had such a thing actually happened, as it sometimes does, the man would almost certainly, according to the existing state of the law, have been hanged.

The medical expert seldom has an opportunity of examining the prisoner until after he has been committed for trial. The magistrates, if they find evidence of guilt on the part of the accused, are bound to send him for trial; they have no power to discuss the question of sanity or insanity. Similarly, whenever there is any evidence of guilt, the grand jury are bound to find a 'true bill'; they have no power to 'cut the bill' on the ground of insanity.

When it is intended to set up insanity as a defence, arrangements are made for the medical witnesses to have one or more personal interviews with the accused.

At the Court of Assize the question of insanity may be raised either on arraignment or during the course of the trial. On arraignment, the jury may be asked (1) whether the prisoner is 'able to plead or not', (2) whether he is 'sane or not' or (3), when the prisoner is asked to plead 'guilty' or 'not guilty' and he takes no notice, 'whether he is mute of malice or by the visitation of God'. Lastly, if the question of insanity is raised during the course of the trial, the jury may be asked to state in their verdict whether they consider the accused 'sane or insane'.

At whatever stage they find a prisoner insane, the judge makes an order for him to be kept in custody 'until His Majesty's pleasure shall become known'. The usual sequel is an order by the Home Secretary for the prisoner to be detained in the criminal asylum at Broadmoor.

Suicide.—In the eyes of the law, suicide is a felony unless the person is found by a coroner's jury to have been insane at the time when he committed the act. By an old Act of Parliament the goods of a person found guilty of *felo de se* may be confiscated by the State but, in practice, this is nowadays

never carried out. Any person who aids and abets another to commit suicide is guilty of murder. If two persons agree to commit suicide together and one fails, the survivor is guilty of murder. If a person, in attempting to commit suicide, occasions the death of another, he is guilty of manslaughter.

A word of warning by way of conclusion. When a medical witness is called upon to give evidence respecting the mental condition of an accused person, he must on no account be tempted to express an opinion concerning the prisoner's responsibility; that is a question for the jury to decide. Even if he be invited by the presiding judge to state whether he considers the prisoner responsible for his crime (in cases of course in which no defence is being offered 'upon the merits of the case'), the court will not be offended if he declines to do so, as he always should.

53 Vict., c. 5, Sched. 2, Form 1.

Petition for an Order for Reception of a Private Patient.

In the Matter of _____
a person alleged to be of unsound mind.

(a) —— a Justice of the Peace for ——, *or* His Honour the Judge of the County Court of ——, *or* —— Stipendiary Magistrate for ——.

To (a) _____

_____

_____

The Petition of _____

(b) *Full postal address, and rank, profession, or occupation.*

of (b) _____

in the County of _____

(c) At least twenty-one.

1. I am _____ (c) years of age.

(d) A lunatic, *or* an idiot, *or* a person of unsound mind.

2. I desire to obtain an Order for the Reception of _____ as (d) _____

(e) Asylum, *or* hospital, *or* house, *as the case may be.*

in the (e) _____ of _____

(f) *Insert a full description of the name and locality of the asylum, hospital, or licensed house, or the full name, address, and description of the person who is to take charge of the patient as a single patient.*

situate at (f) _____

3. I last saw the said _____

at _____

(g) *Some day within 14 days before the date of the presentation of the petition.*

on the (g) _____ day of _____ 19____.

(h) *Here state the connection or relationship with the patient.*

4. I am the (h) _____ of the said _____

[or if the Petitioner is not connected with or related to the Patient, *state as follows :—*]

I am not related to or connected with the said _____

_____

The reasons why this Petition is not presented by a relation or connection are as follows :

The circumstances under which this Petition is presented by me are as follows :

5. I am not related to or connected with either of the persons signing the certificates which accompany this petition as (*where the petitioner is a man*) husband, father, father-in-law, son, son-in-law, brother, brother-in-law, partner, or assistant (*or where the petitioner is a woman*), wife, mother, mother-in-law, daughter, daughter-in-law, sister, sister-in-law, partner, or assistant.

6. I undertake to visit the said _____

_____ personally, or by someone specially appointed by me, at least once in every six months while under care and treatment under the Order to be made on this Petition.

7. A Statement of Particulars relating to the said _____ accompanies this Petition.

If it is the fact, add : 8. The said _____

(*i*) Asylum, *or* hospital, *or* house, *as the case may be.*

has been received in the (*i*) _____

under an Urgency Order dated the _____

_____

The petitioner therefore prays that an Order may be made in accordance with the foregoing Statement.

(*k*) *Full Christian and surname.*

(Signed) (*k*) _____

_____

Date of presentation of the Petition, this _____

day of _____ 19__.

53 Vict., c. 5, Sched. 2, Forms 4, 2, 8, and 9.

Form of Urgency Order for the Reception of a Private Patient, with Medical Certificate and Statement accompanying Urgency Order.

I, the undersigned, being a Person Twenty-one years of age, hereby authorize you to receive as a Patient into your (a)_____

(a) House, *or* hospital, *or* asylum, *as a single patient.*

(b) *Name of patient.* (b)_____

(c) Lunatic, *or* an idiot, *or* a person of unsound mind.

as a (c)_____ whom I last saw at_____

(d) *Some day within two days before the date of the Order.*

on the (d)_____ day of_____ 19____.

I am not related to or connected with the Person signing the Certificate which accompanies this Order in any of the ways mentioned in the Margin. (e) Subjoined *or* annexed hereto is a Statement of Particulars relating to the said_____

(e) Husband, wife, father, father-in-law, mother, mother-in-law, son, son-in-law, daughter, daughter-in-law, brother, brother-in-law, sister, sister-in-law, partner, *or* assistant.

(Signed)

Name and Christian Name at length - - - - _____

Rank, Profession, or Occupation (if any) - - - _____

Full Postal Address - - _____

How related to or connected with the Patient - - _____

[*If not the husband or wife, or a relative of the patient, the person signing to state as briefly as possible:— 1. Why the Order is not signed by the husband or wife, or a relative of the patient. 2. His or her connection with the patient, and the circumstances under which he or she signs.*]

Dated this_____ day of_____ 19____.

(f) Superintendent of —— the —— asylum, —— hospital, *or* resident licensee of the —— house [*describing the asylum, hospital, or house by situation and name.*]

To (f)_____

_____

Form 2.

Statement of Particulars referred to in the annexed Petition.

If any Particulars are not known, the Fact is to be so stated.

[Where the patient is in the Petition described as an idiot, omit the particulars marked *.]

The following is a Statement of Particulars relating to the said _____

Name of Patient, with Christian Name at length

Sex and Age - - -

When the Petitioner or person signing an Urgency Order is NOT the person who signs the Statement, add the following particulars concerning the person who signs the Statement.

Name, with Christian name at length - - _____

Rank, profession, or occupation (if any) - _____

How related to or otherwise connected with the patient - - - - - - - - _____

53 Vict., c. 5, s. 31.

When neither Certificate is Signed by the usual Medical Attendant.

I, the undersigned, hereby state that it is not practicable to obtain a Certificate from the usual Medical Attendant of (*a*) _____

(*a*) Name of patient.

for the following reasons, viz. :—

(*b*) To be signed by the petitioner.

(Signed) (*b*) _____

_____ 19____.

53 Vict, c. 5, Sched. 2, Form 8

Certificate of Medical Practitioner.

In the Matter of _____

(*a*) *Insert residence of patient.*

of (*a*) _____

(*b*) County, city, or borough, *as the case may be.*

in the (*b*) _____ of _____

(*c*) *Insert profession or occupation, if any.*

(*c*) _____ an alleged lunatic.

I, the undersigned _____ do hereby certify as follows :

1. I am a person registered under the Medical Act, 1858, and I am in the actual practice of the medical profession.

2. On the _____ day of _____ 19____

(*d*) *Insert the place of examination, giving the name of the street, with number or name of house, or should there be no number, the Christian and surname of occupier.*

at (*d*) _____

in the (*e*) _____ of _____

(*e*) County, city, *or* borough, *as the case may be.*

I personally examined the said _____

and came to the conclusion that he is (*f*) _____

(*f*) A lunatic, an idiot, *or* a person of unsound mind.

and a proper person to be taken charge of and detained under care and treatment.

3. I formed this conclusion on the following grounds, viz. :

(*a*) Facts indicating Insanity observed by myself at the time of examination (*g*), viz. : _____

(*g*) *If the same or other facts were observed previous to the time of the examination, the certifier is at liberty to subjoin them in a separate paragraph.*

(*b*) Facts communicated by others (*h*), viz. : _____

(*h*) *The names and Christian names (if known) of informants to be given, with their addresses and descriptions.*

(*i*) *If an urgency certificate is required, it must be added here. Form No.* 9.

I certify that it is expedient for the welfare of the said _____ [*or* for the public safety, *as the case may be*] that the said _____ should be forthwith placed under care and treatment.

My reasons for this conclusion are as follows : (*i*) _____

(*k*) *Strike out this clause in case of a private patient whose removal is not proposed.*

4. The said _____ appeared to me to be [*or* not to be] in a fit condition of bodily health to be removed to an asylum, hospital, or licensed house (*k*).

5. I give this certificate having first read the section of the Act of Parliament printed below.

Dated this_____day of _____

One thousand nine hundred and_____

(Signed) _____

(*l*) *Insert full postal address.* of (*l*)_____

Extract from Section 317 of the Lunacy Act, 1890.

Any person who makes a wilful misstatement of any material fact in any medical or other certificate, or in any statement or report of bodily or mental condition under this Act, shall be guilty of a misdemeanour.

53 Vict., c. 5, Sched. 2, Form 3.

Order for Reception of a Private Patient.

To be made by a Justice appointed under the Lunacy Act, 1890, Judge of County Courts, or Stipendiary Magistrate.

(*a*) A Justice for —— specially appointed under the Lunacy Act, 1890; *or* the Judge of the County Court of ——, *or* the Stipendiary Magistrate for ——.

I, the undersigned _____

being a (*a*)_____

upon the petition of _____

(*b*) *Address and occupation.* of (*b*)_____

in the matter of _____

(*c*) *Or* an idiot *or* person of unsound mind.

a Lunatic (*c*)_____accompanied by the Medical Certificates of_____

and_____

hereto annexed, and upon the undertaking of the said

(*d*) *Name of petitioner.* (*d*)_____ to visit the said_____

personally or by someone specially appointed by the said (*d*)_____

once at least in every six months while under care and treatment under this Order, hereby authorize you to receive the said _____

(e) Asylum, or hospital, or house, or as a single patient.

as a Patient into your (e) _____

And I declare that I have [*or* have not] personally seen the said _____ before making this Order.

Dated this _____ day of _____ 19____.

(Signed) (a) _____

Justice for _____ *appointed under the above-mentioned Act* [or *the Judge of the County Court of* _____ or *a Stipendiary Magistrate*].

(f) *To be addressed to the medical superintendent of the asylum or hospital, or to the resident licensee of the house in which the patient is to be placed.*

To (f) _____

---

53 Vict., c. 5, s. 7 (4).

When a Previous Petition has been Dismissed.

I, the undersigned, hereby state that a former Petition for the Reception of (a) _____

(a) Name of patient.

into (b) _____

(b) Name of asylum, hospital, licensed house, or single charge.

was presented to _____

(c) _____

(c) Justice of the Peace for ——, *or* Judge of County Court of ——, *or* Stipendiary Magistrate for ——.

in the month of _____, 19____, and dismissed.

Herewith is a copy (furnished by the Commissioners in Lunacy) of the Statement sent to them of the reasons for its dismissal.

(Signed) _____

_____ 19____.

APPENDIX A.

METHODS OF STAINING THE NERVOUS SYSTEM.

FOR all ordinary purposes the following methods of making microscopic preparations of the nervous system will be found sufficient.

Pieces of tissue requiring examination should be not more than ½ to 1 centimetre in thickness and should be hardened as a rule in a 10 per cent. solution of formalin, formalin being a 40 per cent. solution of formaldehyde. The specimens are ready for further treatment in about ten days.

To prepare them for the microtome they should be washed for twelve hours in running water, placed in methylated spirit for twenty-four hours, then in absolute alcohol and ether (equal parts) for twenty-four hours. They are then ready for embedding in photoxylin, a substance closely related to celloidin.

They should first be placed in thin photoxylin solution (1) and then transferred to a thick solution (2) of syrupy consistence :

(1)	Photoxylin	℥ij.
	Absolute alcohol	℥xij.
	Ether	℥xij.
(2)	Photoxylin	℥jv.
	Absolute alcohol	℥ij.
	Ether	℥ij.

They are mounted on pieces of wood about ¾ inch cubical. The piece of tissue is taken on a section lifter out of the second photoxylin jar and placed on a piece of wood, with plenty of the photoxylin solution round it. There it remains for a variable time, about a quarter of an hour in moderately warm weather, until the photoxylin becomes of the consistence of a firm jelly. The specimen is labelled by writing in pencil on the wood and the whole thing then dropped into a jar of methylated spirit to await section.

Any microtome may be used. The author is accustomed to use Schanze's instrument.

As the sections are cut they are transferred to a pot of methylated spirit.

Nissl's Method of Staining Nerve-Cells.

The sections are placed on the surface of some Grübler's solution of polychromatic methylene-blue in a watch-glass, which is then warmed over a flame until steam appears. They are removed by means of a needle and placed in a basin of water, washed and transferred on a section lifter to methylated spirit, which dissolves out much of the methylene-blue. They are then passed through absolute alcohol, where they remain until differentiation is complete, into aniline oil which stops the process. Some pathologists, instead of using the absolute alcohol and aniline oil separately, leave the sections for some hours in a mixture of the two (equal parts).

The sections are then passed through oil of origanum into benzene, in which they may remain for any length of time. They are finally mounted in colophonium resin dissolved in benzene.

Cox's Method of obtaining a Silhouette of Nerve-Cells and their Processes.

At the autopsy pieces of fresh tissue are washed free from blood and placed in the following :

5 per cent. solution of perchloride of mercury	20 parts.
5 per cent. solution of yellow potassium chromate	16 ,,
Distilled water	40 ,,
5 per cent. solution of potassium bichromate	20 ,,

The bichromate solution should be added last.

The pieces are transferred next day to fresh solution and are ready for cutting in three months. They should not be cut too thin.

The nerve-cells and their processes appear black against a white background.

Stains for Tract Degenerations.

If the tract degeneration is recent, one to six weeks old, advantage is taken of the fact that, while the phosphorized fat of medullary sheaths does not stain with osmic acid, the dephosphorized fat of degenerating medullary sheaths does.

The pieces of nerve tissue to be examined are best fixed in Müller's fluid, which consists of:

Potassium bichromate	2 parts
Sodium sulphate	1 part
Distilled water	100 parts;

but it does not matter if they have been in formalin first.

They are placed for about a fortnight in Marchi's fluid:

1 per cent. solution of osmic acid ..	1 part
2 per cent. solution of potassium bichromate	2 parts;

washed in running water for twenty-four hours and hardened in alcohol. They are then mounted in photoxylin, as described above, and cut. The sections should not be too thin. The degenerated myelin sheaths appear black.

If the tract degeneration is of long standing, the following method of staining the myelin sheaths may be employed (Weigert-Pal).

The sections are cut and lie in methylated spirit. They should be treated separately.

They are first stained for twenty-four hours in Kultschitzky's hæmatoxylin:

Hæmatoxylin	2 grammes
Absolute alcohol	Enough to dissolve
Acetic acid (2 per cent. solution) ..	100 c.c.

This is at its best when it is some months old.

The sections are washed in distilled water and placed in Müller's fluid for two minutes, washed again and placed in a solution of potassium permanganate (75 grammes to 1 pint) until the grey matter is of a yellow tint (usually about one minute). They are again washed and then transferred to Pal's solution:

Pure oxalic acid	1 gramme
Potassium sulphite	1 „
Distilled water	200 c.c.

If the differentiation is not complete, the sections should be washed and the whole process repeated from the potassium permanganate.

The sections are now placed in a strong solution of lithium carbonate for a quarter of an hour and once more washed.

They may be counterstained with picrocarmine.

Dehydrate in

Xylol	3 parts
Absolute phenol	1 part

and mount in Canada balsam.

The degenerated tracts appear pale against a blue background, the undegenerated myelin sheaths being stained blue.

Stain for Axis Cylinders.

There is at present no very satisfactory stain for axis cylinders, but the following method (Freud's) may be tried:

Fresh pieces are hardened, preferably in the dark, in Müller's fluid, washed, further hardened in rectified spirit, embedded in photoxylin and cut. The sections are steeped for about four hours in

Gold chloride	1 part
Distilled water	50 parts
Absolute alcohol	50 parts.

They are then washed and placed for three minutes in

Saturated solution of sodium hydrate ..	1 part
Distilled water	5 parts.

They are again rinsed and steeped for about ten minutes in a 10 per cent. solution of potassium iodide. At this stage they assume a reddish-violet colour. They are now washed, cleared in methylated spirit, absolute alcohol and xylol and mounted in Canada balsam.

Metal instruments must be avoided and glass ones used instead.

Weigert's Stain for Neuroglia.

The pieces are hardened and mordanted in the following fluid for ten days :

Chrome alum	2½ grammes
Copper acetate	5 „
Acetic acid	5 c.c.
Formalin	5 c.c.
Distilled water	100 c.c.

Boil the chrome alum in 80 c.c. of water. Turn out the light and add the acetic acid, then stir in the copper acetate while the mixture is still hot. Filter when cold, then add the formalin and the rest of the water.

It does not matter if the tissue has previously been hardened in formalin. Sections are made by the photoxylin method.

From spirit the sections are transferred to water, then to a 1 in 300 solution of potassium permanganate for ten minutes.

They are washed and placed in the following reducing solution :

Chromogen	5 grammes
Formic acid	5 c.c.
10 per cent. solution of sodium sulphite	10 c.c.
Distilled water	90 c.c.

The sodium sulphite is added immediately before using the solution.

When the brown sections have been decolourized they are twice thoroughly rinsed and placed in a 5 per cent. aqueous solution of chromogen for a few minutes.

They may then be counterstained, preferably on the slide, with

Saturated solution of picric acid ..	10 c.c.
1 per cent. solution of soda-carmine ..	2 c.c.
Absolute alcohol	90 c.c.

The section is now blotted and a saturated solution of methyl violet in rectified spirit dropped on it. This solution must be prepared with hot alcohol and be filtered after cooling. The section stains almost instantaneously.

The superfluous methyl violet is blotted up and a *saturated solution of iodine in a 5 per cent. solution of potassium iodide* dropped on the specimen and immediately poured off. The specimen is then thoroughly washed in aniline-xylol (equal parts), then in pure xylol and finally mounted in Canada balsam.

APPENDIX B.

CYTOLOGICAL EXAMINATION OF THE CEREBRO-SPINAL FLUID.

AN examination of the cerebrospinal fluid is sometimes of assistance in the diagnosis of disease. In the department of medicine which forms the subject of this book such an examination is especially useful as an aid to diagnosis in doubtful cases of general paralysis.

Lumbar Puncture.—A specimen of the fluid may be obtained during life and without injury to the nervous system by means of a hollow needle passed into the spinal canal, preferably between the fourth and fifth lumbar spines. This may be done while the patient lies in bed on his side, but it is much better if he sits on a low stool, stoops forward and dangles his arms between his knees, the finger-tips resting on the floor. This position tends to separate the lumbar spines from one another.

The requisite apparatus consists of a test-tube, a hollow needle made of platinum or iridium so that it will not snap and may be boiled without rusting, a stilette of the same metal and an all-glass syringe or a suitable piece of metal to fit the end of the needle and serve as a handle. These should all have been sterilized by heat and the patient's skin over the fourth and fifth lumbar spines cleaned and rendered aseptic by an antiseptic lotion.

Now a straight line drawn across the back at the level of the highest point of the iliac crest passes over the fourth lumbar spine. The needle should therefore be entered immediately below this.

The operator places his left forefinger over the fourth lumbar spine to serve as a guide and enters the needle in the middle line in the space immediately below. The needle is pushed horizontally forward for a distance of 3½ inches (in an adult).

Should the operator strike bone, the needle must be slightly withdrawn and pushed in a little higher or lower, as the case may be. When the handle or syringe is removed the fluid drops from the end of the needle. If this does not happen the lumen of the needle should be cleared by means of the stilette.

The first few drops are allowed to escape since they are liable to be contaminated with blood ; then about 5 to 8 c.c. are collected in the test-tube. This is closed with a piece of sterilized wool and the wound sealed with collodion.

Preparation of Specimens.—The best method of preparing the fluid for examination is that of Alzheimer.

Absolute alcohol is added to the fluid in the proportion of one to two, and the whole well shaken to ensure thorough mixture. This coagulates the albuminous constituents.

The mixture is placed in the electric centrifuge for one hour. This drives to the bottom of the test-tube the particles of coagulated albumin with any cellular constituents and welds them into a little solid mass.

The supernatant fluid is poured off and the mass is hardened by treating it with absolute alcohol for one hour.

It is now treated with alcohol and ether (equal parts), then with ether (one hour each), loosened from the bottom of the test-tube with a fine platinum needle and gently shaken into thin photoxylin in which it remains for twelve hours or more. It is then transferred to thick photoxylin and mounted on a block of wood as described in Appendix A.

Sections are made of a thickness of 14 μ and treated as follows :

The photoxylin is dissolved in absolute alcohol and ether and the sections are passed through rectified spirit into water.

They are then stained for about six minutes in the following solution (Pappenheim's pyronin-methyl green) in the incubator :

Methyl green	0·3 parts
Pyronin	0·25 ,,
Alcohol (96 per cent.)	2·5 ,,
Carbolic acid (5 per cent.)	100 ,,

The sections are immediately transferred to a basin of cold water to remove superfluous stain and placed in absolute alcohol until the colour ceases to come away.

Lastly they are cleared in xylol or oil of cloves and mounted in Canada balsam.

Cytological Examination.—The microscopical appearance of a specimen prepared in the above manner is shown in Fig. 65. Nuclei are stained blue and protoplasm pink.

Lymphocytes.—These are nearly all nucleus with a 'clock-face' arrangement of chromophilic granules.

Endothelial Cells.—The nucleus is 'horse-shoe' shaped or oval and is eccentric in position. There are very few or no chromophile granules. The nucleus does not stain quite so deeply as that of lymphocytes. They are sometimes phagocytic, as seen in the cell marked 'phagocyte' in Fig. 65.

Plasma Cells.—The nucleus is eccentric in position and has a well-marked 'clock-face' arrangement of chromophile granules. The protoplasm stains more deeply at the periphery than near the nucleus.

Polymorphonuclear Leucocytes.—The appearance of these is too well known to require description. The nucleus is of characteristic shape and the protoplasm is not stained by the above method.

In normal fluid one may expect to find five to fifteen cells in a hundred fields, lymphocytes and endothelial cells only.

In general paralysis all the above forms are common and plasma cells probably occur in no other disease. There may be 200 to 1,000 or more cells in 100 fields, but the characteristic feature is the high percentage of lymphocytes (over 60 per cent. in 80 per cent. of cases and over 70 per cent. in 70 per cent. of cases). The cell-count is for some unknown reason much higher when the fluid is obtained post-mortem.

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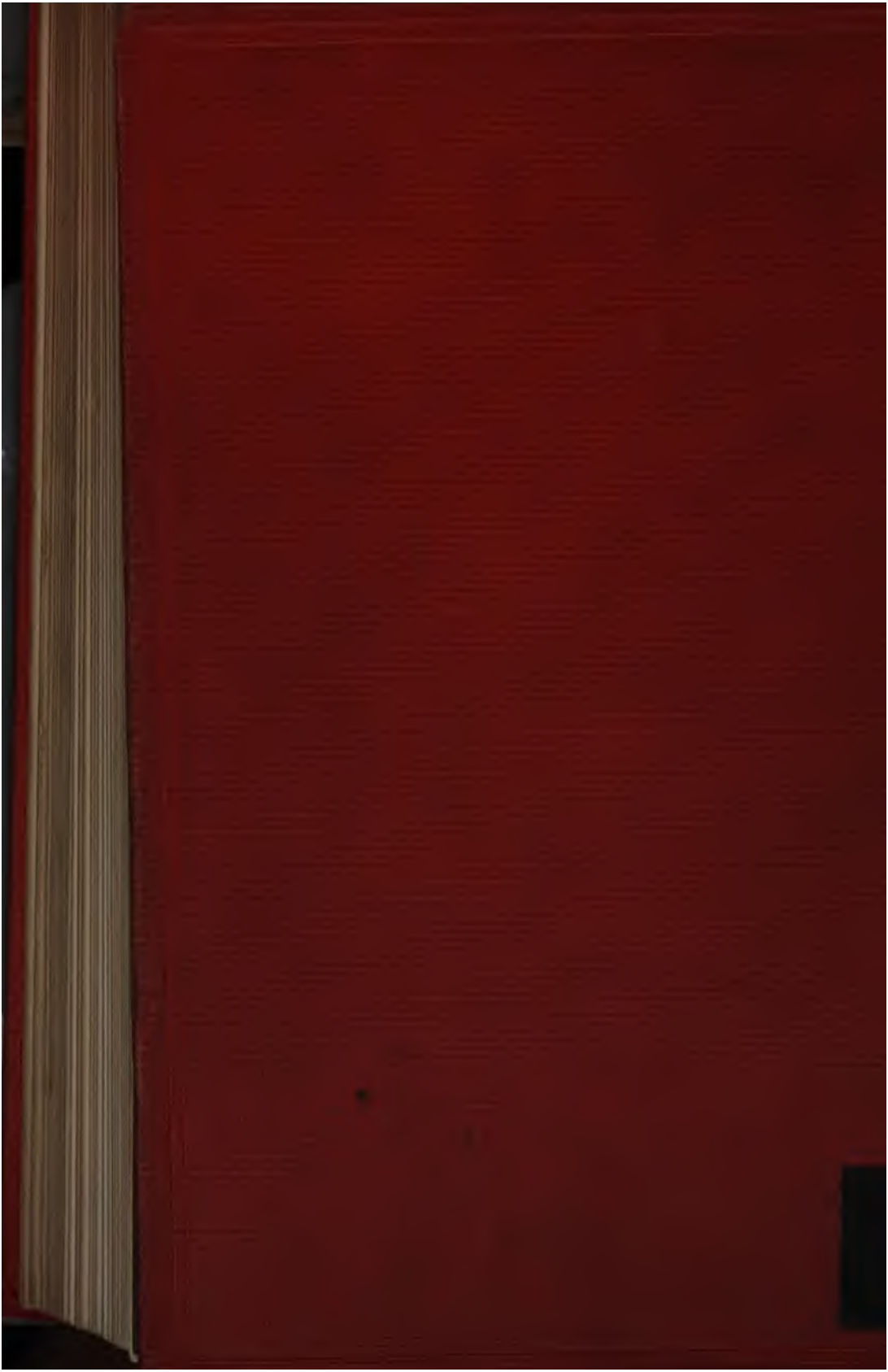
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